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Royal School of Mines

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THE

CALENDAR

OF THE

TOKIO KAISEI-GAKKO,

OR

IMPERIAL UNIVERSITY OF TOKIO.

FOR THE YEAR

1876.

PUBLISHED BY THE DIRECTOR.
1876.

CONTENTS.

CALENDAR

1876.

1876.—January 8. The session reopens after the New-Year's recess.

January 30. Holiday ; Matsuri of Komei Tenno.

February 2. Semi-annual examination begins.

February 11. Holiday ; Accession of Zimmu Tenno.

February 15. First session ends ; a rest of three days.

February 16. Second session begins.

April 3. Holiday; Matsuri of Zimmu Tenno.

May 1. Lectures begin from 7 A.M.

June 29. Class examinations for promotion begin.

July 10. Second session ends.
July 11. Summer vacation begins.
September 11. First session begins.
September 17. Holiday; Matsuri of Kannane.
November 1. Lectures begin from 8 A.M.
November 3. Holiday; Birthday of the Emperor.
November 23. Holiday; Matsuri of Niiname.
December 24. Session suspended for New-Year recess.
1877.—January 8. Session reopens.

DIRECTORS, PROFESSORS AND OFFICERS.

DIRECTORS.

HATAKEYAMA-YOSHINARI, A.M.,............*Kagoshima.*
Director.

HAMAO-ARATA.....................................*Toyoöka.*
Vice-Director.

PROFESSORS* AND ASSISTANTS.

PETER V. VEEDER, A.M., D.D.,.................*America.*
Experimental and Cosmical Physics.

HORACE WILSON, A.M...........................*America.*
English Language and Mathematics.

D. BETHUNE MCCARTEE, A.M., M.D.,.........*America.*
Natural History and Political Economy.

PROSPERE FORTUNE FOUQUE, Bachelier ès Sciences.......................................*France.*
Mathematics and Linear Design.

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* Arranged in the order of seniority of service.

James Summers....................................*England.*
English Literature and Logic.

William E. Grigsby, A.M.,......................*England.*
English and International Law.

Robert William Atkinson, B.Sc.,............*England.*
Analytical and Applied Chemistry.

Robert Henry Smith............................*Scotland.*
Mechanical Engineering.

William Edwin Parson, A.M.,................*America.*
Mathematics.

Edward W. Syle, A.M., D.D.,................*England.*
History and Philosophy.

Horatio N. Allin, A.M.,......................*America.*
English Language and Law.

Leon Dury, Bachelier ès Lettres, et Docteur en Medicine ....*France.*
French Literature and History.

Stephone Mangeot, Licencié ès Sciences Mathematiques, et Licencié ès Sciences Physiques...*France.*
Mathematics.

G. Jewett Rockwell, A.M.,..................*America.*
General Chemistry and Chemical Physics.

Gottfried v. Wagener, Ph. D...............*Germany.*
Arts and Manufactures.

James R. Wasson, late U. S. Army.........*America.*
Civil Engineering.

Edmund Naumann, Ph. D.....................*Germany.*
Mineralogy, Geology and Mining.

GUSTAV FELIX BERSON, Agrégé des Sciences Physiques.......................................*France.*
Physics and Mechanics.

TOYAMA-MASAKAZU, Gotokioju.*..............*Shizuoka.*
English Literature. Chemistry in the Technical Department.

ENOUYE-YOSHIKAZU, LL.B., Gotokioju..........*Tokio.*
Law.

KUMAZAWA-ZENNAN....................................*Sakai.*
Instructor in Physics and Chemistry in the Technical Department.

KOGA-MORITARO. ....*Nagasaki.*
Instructor in French.

YAMAOKA-GIRO....................................*Tsuruga.*
Assistant in Chemistry.

YAMAGAWA-KENJIRO, Ph. B.......................*Aomori.*
Assistant in Physics.

UYENO-TSUGUMITSU....................................*Tokio.*
Instructor in Mathematics in the Technical Department.

YAMAOKA-NARIAKI....................................*Tokio.*
Instructor in Drawing.

NAKANO-TOSHIO.................................... *Tsuruga.*
Assistant in Geology and Mining.

KANO-TOMONOBU....................................*Tokio.*
Instructor in Drawing.

OSADA-GINZO..*Tokio.*
Instructor in Practical Arts in the Technical Department.

* There are five degrees of Professorship in the University and Gotokioju means professor of the fifth rank.

WADA-TSUNASHIRO.................................*Tsuruga.*
Instructor in Mineralogy in the Technical Department.

TAGA-AYATO ....*Chiba.*
Assistant in Engineering.

SHOJI-IKKI..*Tokio.*
Assistant in Chemistry in the Technical Department.

SHIMOAKI-MOTOJIRO ....*Ishikawa.*
Assistant in Chemistry in the Technical Department.

OSHIMA-BUN ....*Shizuoka.*
Instructor in Chinese.

NIWA-TADAMICHI..*Aichi.*
Instructor in Chinese.

OFFICERS.

ENOUYE-YOSHIKAZU ....*Tokio.*
Inspector.

KOGA-MORITARO......................................*Nagasaki.*
Inspector.

YAMAOKA-GIRO...*Tsuruga.*
Curator of Apparatus.

IGARASHI-KIOJI ....*Tokio.*
Secretary.

KISHI-TETSUJI ....*Okayama.*
Treasurer.

HATANO-KUNIOKI .... *Gifu.*
Building Officer.

IKEDA-YASUMITSU .... *Shizuoka.*
Librarian.

INOÖKA-DAIZO .... *Okayama.*
Officer in charge of the purification of Chemicals.

HIDESHIMA-BUNKEI................................. *Mitsuma.*
Physician.

HISTORICAL SUMMARY.

The institution out of which the present Kaisei Gakko sprang, was founded by the Government of the Tokugawa family under the name of the Yogaku-sho (Institute of Western Knowledge), and its first location was at Kudan Zaka, Yedo. Among the earliest directors are said to have been Tsutsui Hizen-no-kami, Kawaji Sayemon-no-go, and Okubo Wukon-Shogen. It was opened for instruction in January, 1857, under Koga Kinichiro as principal, and Sugita Seikei, Mitsukuri Gempo, and others as teachers. At first only the retainers of the Tokugawa family were admitted into the institution, but afterwards the privilege was extended to the retainers of all the other families. The only language at first taught was the Dutch, but soon English and French as well as German and Russian were added. It was about this time that the institution conferred upon our nation an everlasting benefit by causing an English and Japanese Dictionary to be published. Among those who had the honor to compile this Dictionary

were Hori Tatsnoske, Nisi Shiuske, and Mitsukuri Teiichiro (now Rinsho).

After several temporary removals the institution was finally located in 1862 at Gogingahara, where the buildings now occupied by the Foreign Language School, were erected for its accommodation. In the year following, departments of instruction in Mathematics and Chemistry were created. The same year was marked by the sending of four students from this institution to Russia. When in 1866 the Government sent fourteen students to England, five of them were chosen from among the students of the institution. The first foreign teacher was employed in 1866, Mr. Gratama, of Holland, as Professor of Chemistry.

During the revolution in 1868, the school was closed, and the buildings were temporarily occupied as infantry barracks. But in September the school was again opened by the present Government under the charge of Kawakatzu-Omi and Yanagawa-Shunzo as directors, who were soon succeeded by Uchida-Tsunejiro. In January 1869, Hosokawa Junjiro was appointed as Uchida's associate. In July 1869, Hosokawa was transferred to another office, and Kato Hiroyuki was appointed as his successor. Since that date the directors have been changed several times. In 1869, Mons. Pousset was employed as teacher of the French language and Mr. Parry of the English. In April of the same year, Mr. G. F. Verbeck became a professor in the institution, which

position and subsequently that of principal, he continued to hold till September, 1873. In July 1870 the Central Government marked its appreciation of higher learning by directing each provincial Government (Han) to select according to the revenue received for education, one or more pupils, to be educated in the Kaisei Gakko. In June 1869, a German Department was added to the school.

In July 1871, the Department of Education in connection with the other Departments of the Government was entirely reorganized. The present Mombusho was established and took charge of educational affairs throughout the empire. Important changes were introduced into the Kaisei Gakko, rendered necessary by the increase in number, and the advancement of the pupils. Systematic courses of study were established and additional branches were introduced. In March 1872 His Imperial Majesty the Tenno made a visit to the Kaisei Gakko. As this was the first occasion of the kind in the history of the empire, it was justly regarded as beginning a new era in the progress of education, in which the Head of the Nation was to take the education of his people under his special care.

In April 1873 the institution took another important step in advance. The progress of the pupils during the past years had brought them to a point where facilities for higher education were required. Accordingly provision was made for instruction in

several departments of special and technical learning. Courses of study were therefore projected in Law, Chemistry and Engineering, in English; in Polytechnic Science, in French; and in Mining, in German. A General Course of study, forming a suitable preparation for these special studies, was arranged.

During the summer of this year new buildings were erected for the advanced departments, and on the 19th October were opened by His Imperial Majesty the Tenno. From this time the advanced departments alone constituted the Kaisei Gakko and the old buildings continued to be occupied by the lower classes, which were organized into a separate Foreign Language School, arranged to comprise departments in the English, French, German, and Chinese languages.

The present Director, Hatakeyama-Yoshinari, began his duties December 19th 1873, and Hamao-Arata, Vice-Director, October 1874.

In June 1875, eleven students were selected from the Kaisei Gakko to be sent to pursue their studies in foreign countries.

The difficulty of carrying on higher special and professional education in three foreign languages, in accordance with the original plan, very early became apparent. Hence in June 1873, the Department of Education announced its determination to employ ultimately only one foreign language for the purposes of higher education in the Kaisei Gakko, and

to confine instruction in the others to the schools of foreign languages.

In September 1875, the practical realization of this purpose began.

The Polytechnic course in the French, and that of Mining in the German language, were abolished and a special course in Physics was established in the French Department. In June 1876 a number of students were again selected from the highest classes of the University to be sent to continue their studies in foreign countries, eight going to England and two to France.

REGULATIONS.

I.—ORGANIZATION.

1.—The Kaisei Gakko is a Government University under the control of the Department of Education, and is designed to provide education in the higher and special branches of learning.

2.—Instruction is given at present mainly in the English language.

3.—The University provides, for the present, the following courses of study, each three years in length, viz :—

1st.—A General Course in Literature and Science, designed to be introductory to the special courses.

2nd.—A Special Course in Law.

3rd.—A Special Course in Chemistry.

4th.—A Special Course in Engineering.

To these, other departments of special instruction will be added, as the circumstances of the institution may allow.

4.—A Special Course has been established in the French Language for instruction in the higher branches in Physics, for the accommodation of those students who had previously been in the French Department.

5.—These is a Technical Department attached to the Kaisei Gakko for instruction in the Arts and Manufactures. In this Department instruction is entirely conducted in the Japanese language.

II.—ADMISSION.

1.- Applicants for admission to the General Course must pass a satisfactory examination in the following subjects, viz :

Reading and composition in the Japanese language.

Reading, writing, speaking, and composition in the English language.

Geography, descriptive and political.

Elementary General History.

Arithmetic, and Algebra as far as Quadratic Equations.

2.—Students are admitted annually at the beginning of the academic year in September. Examinations

for admission will be held each year in July, during the three days immediately preceding the close of the session, and also in September, during the first three days of the session.

3.—Applicants for admission to an advanced standing, besides being examined upon the subjects named in Article 1, will also be examined in the subjects of study already passed over by the class which they desire to enter.

4.—Applicants must be above fifteen years of age.

5.—Before admission all applicants undergo a medical examination: and no persons will be received who have not been vaccinated, or who are found to have contracted any organic disease which is liable to interrupt their course of study.

6.—After an applicant has passed his entrance examination he is required to present a bond executed on the part of himself and an approved surety, by which *he binds himself to conform to the regulations of the institution*, and to remain in the institution until he completes his chosen course of study.

III.—EXAMINATIONS AND GRADES.

1.—Examinations for the purpose of testing the advancement of the students and determining their relative rank in scholarship, will be held at the end of each term. In addition to these periodical ex-

aminations, the professors may at their discretion hold intermediate examinations, and the results of such examinations will be taken into account in estimating the grade of students for the term.

2.—The periodical examinations will be conducted partly in writing and partly orally, and a report will be made by each professor of the results in each subject of study. They will be held after due notice, and officers from the Department of Education will be present.

3.—A record of the term work of the classes will be kept, either daily, or as shown in their occasional examinations, graded from 0 for a failure to 10 for perfect work. At the end of each session each professor shall report to the director the combined result of such recorded marks in each subject, estimated on a scale of 100, and shall also report the corresponding marks obtained in each subject at the periodical examination.

4.—The grade mark of each student in each subject will be determined by combining the marks obtained for class work during the term, and those obtained at the examination, allowing twice as much weight to the former as to the latter.

5.—The general average of each student will be determined by combining the marks obtained by him in his several studies, allowing to each a weight proportioned to the time allotted to it in the schedule of studies.

6.—At the close of each term a list of each class will be posted in the Director's room, arranged in the order of merit, giving for each student his relative standing in each subject, and also his general average.

In the Calendar the names of the students will be printed in the order of merit.

7.—If in any study the mark of a student falls between 40 and 60, he will be allowed two months for preparation and then will be submitted to a new examination.

8.—No student will be entitled to receive a certificate at the close of the general course, or be allowed to enter as a student in either of the special courses, if he fails to pass in his examinations in any of the subjects of his previous course.

In like manner any student who fails to pass in any of the subjects of his special course will not be recommended to the Minister of Education for a diploma.

Provided, however, if the failure to pass in either of the above cases be in not more than two subjects, and these of minor importance, the Director may, on the special recommendation of the faculty, in the case of a promising and diligent student, suspend the operation of this rule.

9.—If in any study the grade mark of any student for any session fall below 60, he shall not at the end of the year be promoted to the higher grade, *unless* he shall on re-examination be found to have made up his deficiency.

4.—During the period from November 1st to April 30th, the lectures are held between 8 A.M. and 12 M., and between 1.30 P.M. and 2.30 P.M. During the the period from May 1st to October 31st, the lectures are between 7 A.M. and 12 M.

The exercises of the classes in Japanese translation and composition are held for one hour between the hours of 3 P.M. and 5 P.M.

VI.—OF STUDENTS' EXPENSES AND SUPPORT.

1.—To all students hereafter admitted to the Kaisei Gakko, a tuition fee of two yen per mensem is charged in the General Course, and four yen in any one of the Special Courses. It is payable at the beginning of each month.

2.—When a student is unable to pay the fees for tuition, the Director, upon the presentation of satisfactory evidence thereof, may reduce the tuition fee to one-half, or if necessary, to one-fourth, of the regular sum.

3.—For those who desire to reside in the University suitable quarters are provided. They will be furnished with food, fuel, lights, and other requisites at cost. At present the price of board, fuel, lights

etc., is about four yen per mensem, but it may vary with changes in the prices of the articles furnished. Furniture suitable for the rooms will be provided at the rate of thirty sen, and washing and mending at twenty-five sen, per mensem.

These charges are payable at the end of each month.

In case of illness, students are supplied with the necessary medicines, for which they pay one-fourth of the actual cost.

VII.—OF RESIDENT STUDENTS.

1.—It is required that all Students shall regularly take exercise by walking, athletic games and gymnastic drill. Provision is made for regular instruction in gymnastics under competent teachers.

2.—Attention to personal neatness is enjoined upon all the students, and courtesy and politeness are expected from them towards officers, professors, visitors and each other. Those failing in these particulars, or failing to maintain on all occasions the character and manners of gentlemen, will be deemed unfit to enjoy the privileges which the government provides for them in this University.

3.—Each room shall appoint in succession one of its number to serve as day-officer, who shall be responsible for any disorder in the rooms and shall

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3.—Each room shall appoint in succession one of its number to serve as day-officer, who shall be responsible for any disorder in the rooms and shall

report any want of neatness in dress on the part of his room-mates. Offences in these particulars shall be reported to the inspector. Students under seventeen years of age are exempt from serving as day-officer.

4.—The student in each class or section, who has had the highest general average at the preceding examination, shall have the title of Class-leader, and he shall be the spokesman of his class when necessary.

VIII.—OF THE HOSPITAL AND MEDICAL ATTENDANTS.

1.—A hospital under the charge of a competent medical staff is provided for the reception of those who are sick.

2.—A medical officer will, as often at least as once a month, make an inspection of the students, and their rooms, clothing, and food, and is empowered to take measures to correct whatever endangers their health and vigor.

3.—Students receiving medical attendance, either in their rooms or at the Hospital, are required to pay only one-fourth the cost of the medicines prescribed.

IX.—OF THE LIBRARY.

1.—The books in the Library of the University are for the use of the professors and students.

The books of reference are not lent, but are to be consulted in the Library.

2.—The students are required to supply themselves with their respective text-books, but in case any of them are unable to do so, the Director may give them a special permission to borrow them of the Library.

3.—The books required for the several classes are issued by the Librarian to the students on the presentation of a certificate, signed by the respective professors and counter-signed by the inspector.

4.—When books are lost or injured, those to whom they have been lent are held responsible and must make repayment.

5.—A Reading Room is provided for the use of the professors and students, containing books, periodicals and newspapers. It is open to the students on ordinary days from 12.30 P.M. to 9 P.M. Neither books nor periodicals can be taken from this room.

6.—The collection of Books in the Library of the University consists mainly of books of reference and text-books for use in the several departments of instruction. Important additions have been made during the past few years, especially in the English books on Law, on Engineering, and Chemistry. The

whole number of books in the Library at present is as follows:—

Volumes in English	11,703
„ „ French	3,233
„ „ German	2,124
„ „ Dutch	6,706
„ „ Chinese	4,214
„ „ Japanese	6,798
Total	34,778

X.—OF APPARATUS &c.

1.—The apparatus, models and specimens belonging to the University may be issued to the professors of the several departments, for use in their experimental illustrations.

2.—The collection of apparatus in Physics illustrates, with more or less completeness, the various branches of the subject.

There is a Workshop in connection with the Technical Department of the University, in which the repairs of the apparatus are attended to, and new pieces are made according to models, or from the plans of the professors.

The present available physical apparatus includes: A collection illustrating the laws of motion and force, including Kater's pendulum for measuring the

force of gravity, and Foucault's pendulum for showing the rotation of the earth.

Standard weights and measures of France and the United States, and standard weights of Japan, England and Holland.

Apparatus illustrating the laws of liquids and gases, such as Regnault's apparatus for determining the expansion of gases: Dalton's apparatus for determining the tension of vapors: Gay-Lussac's and Dumas' apparatus for determining the density of gases; air-pumps: models of water-pumps.

Apparatus for illustrating the laws of heat. including Melloni's complete apparatus for the study of radiant heat.

Acoustic apparatus, including monochords, organ pipes, syrens, Koenig's manometric flame apparatus, &c.

Optical apparatus, including a set of mounted mirrors, lenses and prisms: a spectroscope: a large compound microscope; a solar microscope; a magnesium sterioptticon: refracting telescopes, Duboscq's photo-electric regulator, etc.

Electrical apparatus, including a large Ramsden's plate electrical machine, with a full set of appendages.

Galvanic batteries, Thomson's mirror galvanometer and quadrant electrometer.

Morse's electric telegraph.

Ruhmkorff's coils, &c.

3.—For the accommodation of the departments of analytical chemistry, a laboratory, sufficient for its present wants, has been built and fitted up. It contains a large room for analysis, a convenient lecture room, and chemical-stores room, office, &c. The following summary exhibits its principal equipments.

A collection of glass apparatus commonly used by students of qualitative analysis—such as spirit-lamps, flasks, test-tubes, beakers, re-agent bottles, &c.

Apparatus used in quantitative analyses—dessicators, &c.:—

Chemical balances, for heavy, and for light weights.

Assay balances, weights.

Measuring apparatus—flasks, burettes, pipettes.

Platinum crucible-dishes.

Apparatus for organic analysis—Gas and charcoal combustion furnaces, &c.

Apparatus for gas analysis.

Williamson and Russell's gas analysis apparatus.

Cathetometer, barometer, Bunsen's gas apparatus.

Apparatus for determining vapour densities.

Sprengel's mercury pump.

Spectroscope, ordinary refraction, and diffraction.

Galvanic cells, induction coil.

Apparatus for assaying.

Muffle furnaces—Flatting mills, and the other apparatus necessary, &c., crucible, tongs, &c.

Apparatus for experiments at lectures.

Hofman's apparatus for showing the composition of different gases.

Glass blower's table, Bunsen's photometer.

Saccharimeter.

For the illustration of the lectures on chemical technology, diagrams are now in course of preparation.

To meet the needs of the Chemical and Physical Departments there is, in connection with the University, a Laboratory for the preparation and purification of Chemicals. At present the purification is mainly on Acids; but it is intended to make a fuller equipment of the Laboratory and to purify other Chemicals, as may be required.

4.—The engineering collections now in hand, or ordered from Europe and America, are briefly summed up as follows :—

Testing Machine for compressive strength of timber, stone, and brick, &c., &c.

Testing Machine for transverse strength of timber.

Testing Machine for torsional strength of timber.

Testing Machine for tensive strength of wire.

A Collection of tested specimens of about 200 kinds of Japanese timber.

About 100 tested specimens of English iron, steel, timber, &c., &c.

A large number of patterns (as actually used in the foundry) of parts of machines. Model of Skew bevel;

4 Specimens of Boiler work; models of piston and rings; eccentric and clips; Thompson's inward flow turbine; cylinder cover; rim of spur wheel; box coupling; corn mill; reversing gear; shifting slides and cams; worm and worm-wheel; steam crane; forked connecting rod; cross-head piston rod; slide blask and bars; pump; steam engine; cast-iron crank, part of shaft and crank pin.

Model of cone pulley for four speeds, 2 spur and 3 elliptic toothed wheels; five parallel motions.

Whitworth's quick return motion.

Wrought-iron crank shaft.

Cylinder cover and joint.

Model of air pump valve: bevel pinion; breast water wheel; pedestal complete with wall plate: wall bracket and plate; tank corner with outside flanges; connecting rod end; flange coupling; disengaging clutch; arm of bevel wheel; arm of mortice wheel; ship screw-propeller.

A collection of models and diagrams illustrative of properties and behaviour of steam as used in engines, and a Richard's steam engine indicator and reducing gear.

Model of a lattice girder bridge and a bow-string girder bridge; rod reciprocating by means of one eccentric pin and link, also slide and expansion valves; a plate girder bridge: a road suspension bridge: a king post.

Half full model in wood of s.s. "City of Berlin."

" " " " " " s.s. "Macedon."

" " " " " of iron barque "Quillota."

The instruments supplied for the use of surveying students are:

3 Sets of Transit Theodolites: Cradle Theodolite.

Eckhold's Omnimeter; Engineer's Dumpy Level.

2 Sets of Mining Compasses.

2 Sets of Plane Tables.

Prismatic Compass; Optical Square.

Siderial Chronometer; Mean Time Chronometer; Surveyor's Compass; Bunt's Solar Compass.

Box Sextant; 2 Sets of Ship's Sextant and Artificial horizon: Aneroid barometer; Surveyor's Mountain barometer; Clinometer; 2 Sets of Cross Staves; Feet and Metre Chains; Tapes; Arrows: Levelling Rods, &c.

Drawing Office.

Complete furnishings for a Large Drawing Office, viz: Over one hundred Wall Drawings illustrating Civil and Mechanical Engineering.

A collection of models of several Structures for Building in Wood and Iron.

Models of different Screws and Spirals.

Models of different construction of River-dams.

Models of different construction of Staircases.

About one hundred models illustrating geometrical and perspective projection.

Over two hundred pieces of T squares. Set squares French and Ship Curve, Splin, &c., &c.; and three hundred sheets of assorted Drawing Copies, for the use of the Engineering Students.

5.—The following collections are now in hand, or on their way here from Europe and America.

Mineral Cabinet.

Comprised in this Cabinet are the following collections—

1st.—About four thousand mineral specimens, forming the new collection, to be kept under glass in table cases: including a collection of large specimens, to show the association of minerals, and small collections of natural crystals, pseudomorphs, &c., &c.

2nd.—About nine hundred crystal-models in wood and glass, to illustrate the lectures on Crystallography.

3rd.—Over a thousand mineral specimens for the use of the students, and always accessible to them.

4th.—Miscellaneous collections, to illustrate physical properties of minerals, color, hardness, &c.

Geological Cabinet.

This cabinet will include—

A collection of about five thousand specimens of rocks and fossils from Europe and America.

An economic collection of about twelve hundred specimens of ores, fuels, clays, building materials, etc., etc.

A collection of stone and bronze implements.

A collection of casts of rare fossils.

A collection illustrating the geology of Japan.

Mining Cabinet.

Included in this cabinet will be—

A collection of about fifty models in wood and iron, of shafts, slopes, tunnels, and other underground workings, showing different plans of work, manner of timbering, arrangement of hoisting, ventilating, and pumping machinery, tramways, cars, etc., etc.

A collection of actual mining tools, lamps, surveying instruments, anemometers, etc., etc.

Metallurgical Cabinet.

* * * * * * * * *

A collection illustrating the metallurgy of Japan.

Botanical and Zoological Cabinet.

This contains

1st. A very complete "Herbier d'etude," in 30 volumes.

2nd. The "Herbarium of Nippon," in 5 volumes.

Also skeletons, skulls, and models in papier mache of Man, and of the nervous, circulatory and digestive

organs of man, and of the principal orders of animals, together with moulded or otherwise preserved specimens of the animals themselves; as well as charts and drawings illustrating these two branches of Natural History. An expedition has been sent out during the past summer for the collection of specimens for this Cabinet, the results of whose labors promise to greatly enrich the cabinet, and increase the facilities afforded to the students of this university in acquiring a knowledge of the Fauna and Flora of Japan.

XI.—SCHEDULES OF STUDIES.

1.—Students will not be admitted into any one of the special courses, unless they have passed examinations in English, History, Mathematics, Physics, Chemistry, Natural History and Drawing, as mentioned in the schedules of studies in the General Course.

2.—The General Course is pursued for three years, and each year is divided into two terms. Students in the first year of the General Course constitute *the third general class*, those in the second year constitute *the second general class*, and those in the third year constitute *the first general class.*

3.—Students, after having passed the entrance examinations, will form the third general class, and pursue the studies of the General Course in the first

year; but in case any are able to pass the requisite examination, they may be admitted into another suitable class.

4.—The course in Physics, in the subjoined schedules, has been provided only for those students who have learned the French language in the University, and therefore no person will be admitted hereafter into this department.

5.—Besides the studies indicated in the following schedules, all the students in the institution are required to read Japanese books, to practice in Japanese composition, and to make translations from English into Japanese. The Law students are also required to study Japanese Law, and special parts of Chinese Law.

GENERAL COURSE.

FACULTY (1876.)

P. V. VEEDER....................................Physics.
D. B. McCARTEE..................Natural History.
JAMES SUMMERS ....English Literature.
W. E. PARSON..........................Mathematics.
HORACE WILSON.......................Mathematics.
F. W. SYLE...............Philosophy and History.
H. N. ALLIN.......................English Language.
EDMUND NAUMANN......Mineralogy and Geology.
G. J. ROCKWELL..............General Chemistry.
J. R. WASSON..............Instrumental Drawing.
YAMAGAWA-KENJIRO.. ......Assistant in Physics.
NAKANO-TOSHIO..............Assistant in Geology.
YAMAOKA-NARIAKI..........................Drawing.
KANO-TOMONOBU............................Drawing.

FIRST YEAR.

FIRST TERMS:

English Language.—Rhetoric; Composition.
Mathematics.—Geometry; Algebra.
Geography.—Physical.
History.—History of England.

Natural History.—Human and Comparative Anatomy and Physiology.

Drawing.—Free-hand: drawing from copies and from simple models.

SECOND TERM:

English Language.—English Literature.

Mathematics.—Algebra: Geometry.

History.—History of France.

Natural History.—Botany, structural and analytical.

Drawing.—Free-hand: drawing from round or solid forms: shading solid forms.

SECOND YEAR.

FIRST TERM:

English Language.—English Literature: Composition.

Mathematics.—Algebra finished; Geometry.

History.—Philosophy of History.

Physics.—Elements, with experimental illustrations.

Natural History.—Systematic Zoology.

Drawing.—Free-hand, from nature; flowers, fruit and human figure.

SECOND TERM:

English Language.—Logic, with Essays.

Mathematics.—Geometry finished.

History.—Philosophy of History continued.

Social Science.—Political Economy.

Physics.—Elements, with experimental illustrations.

Natural History.—Botanical Classification and Botanical Physiology: with lectures on the Botany of Japan.

Drawing.—Free-hand, from nature: landscapes and architectural forms.

THIRD YEAR.

FIRST TERM:

English Language.—Logic, with Essays.

Mathematics.—Trigonometry and Applications.

Philosophy.—Intellectual Philosophy.

Physics.—Elementary Mechanics: Cosmical Physics.

Chemistry.—General Chemistry (Inorganic).

Natural History.—Elements of Mineralogy.

Drawing.—Instrumental, Geometrical Constructions and Projections.

SECOND TERM:

Cosmical Physics.—Astronomy.

Mathematics.—Conic Sections and Co-ordinate Geometry.

Philosophy.—Moral Philosophy.

Chemistry.—General Chemistry (Inorganic).

Natural History.—Elements of Geology.

Drawing.—Perspective, Machine Drawing, and practice in making sketches, measurements and finished Drawings.

SPECIAL COURSE IN LAW.

FACULTY (1876) :

W. E. GRIGSBY	Law.
H. N. ALLIN	Law.
ENOUYE-YOSHIKAZU	Law.
KOGA-MORITARO	French.

FIRST YEAR.—JUNIOR CLASS.

The Law of Real Property.
The Law of Personal Property.
The Law of Contract.
The Law of Crimes.
French.
Elective :—Constitutional Law.

SECOND YEAR.—MIDDLE CLASS.

The Law of Evidence.
The Law of Procedure.
a.—Civil Proceedings.
b.—Criminal Proceedings.
Equity.
Admiralty Proceedings.

Practice in Moot Courts.
French.
Elective :—Roman Law.

THIRD YEAR.—SENIOR CLASS.

General Review of Two Previous Years.

International Law.
a. Public International Law.
b. Private International Law.
Continuation of Practice in Moot Courts.
Jurisprudence.
Elective :—Special parts of Code Napoleon.

SPECIAL COURSE IN CHEMISTRY.

R. W. Atkinson............................Analytical and Applied Chemistry.
P. V. Veeder....................................Physics.
Edmund Naumann...........Geology and Mining.
G. J. Rockwell...............General Chemistry.
Yamaoka-Jiro............Assistant in Laboratory.
Nakano-Toshio..............Assistant in Geology.
Koga-Moritaro ....French.

FIRST YEAR.—JUNIOR CLASS.

Analytical Chemistry.—Practical work in qualitative and simple quantitative analysis.
Metallurgy.
Organic Chemistry.
Physics.—Lectures and Laboratory Practice.
Mineralogy.
French.—To be studied with special reference to its use in scientific studies.

SECOND YEAR.—MIDDLE CLASS.

Analytical Chemistry.—Quantitative Analysis.
Chemical Technology.
Physics.—Lectures and Laboratory Practice.
Geology.
French.—A French scientific author to be read.

THIRD YEAR.—SENIOR CLASS.

Analytical Chemistry.—Quantitative Analysis and Assaying.
Chemical Technology.
Mining.—Reconnaissance; Surveying; Exploitation; Ore-dressing.

SPECIAL COURSE IN ENGINEERING.

R. H. Smith............Mechanical Engineering.
J. R. Wasson..................Civil Engineering.
Edmund Naumann.............Geology & Mining.
Taga-Ayato.............Assistant in Engineering.
Takao-Toshio................Assistant in Geology.
Koga-Moritaro ....French.

FIRST YEAR.—JUNIOR CLASS.

Higher Mathematics.
Mechanics and Mechanism.
Strength of Materials.—Lectures and Experiments.
Graphic Calculation.—Lectures and Practice.
Land Surveying.—Lectures, Field and Office Practice.
Physics.—Lectures and Laboratory Practice.
French.—To be studied with special reference to its scientific and technical use.

SECOND YEAR.—MIDDLE CLASS.

Thermodynamics, Theoretical and Applied.

Strength of Structures.

Machine Drawing.

Efficiency of Machines, and lectures on Workshop Practice.

Railway Surveying and Construction.—Lectures, Field and Office Practice.

Geology.

Physics.—Lectures and Laboratory Practice.

French.—A French scientific author to be read.

THIRD YEAR.—SENIOR CLASS.

Lectures on the Design of Land, Locomotive and Marine Engines.

Practice in designing Engineering Works, and in making Working Drawings and Estimates.

Hydraulic Engineering.

Geodesy.—Lectures, Field and Office Practice.

Mining.—Reconnaissance; Surveying; Exploitation and Ore-dressing.

SPECIAL COURSE IN PHYSICS.

PROGRAMME DES COURS DE PHYSIQUE.

FACULTL (1876.)

G. BERSON..................Physique at Mécanique.
S. MANGEOT..........................Mathématiques.
P. FOUQUE......Mathématiques et dessin linéaire.
L. DURY......................Littérature et histoire.

ANNÉE.

Physique ....Physique élémentaire.
Mathématiques...Algèbre complémentaire, Géométrie analytique plane, Géométrie analytique de l'espace, Géométrie descriptive (théorie et épure.)
Mécanique.........Mécanique élémentaire.
Dessin.

3.—Although the object of this department is as stated above, the students must go through a preliminary course of instruction in Chemistry, Physics, Mathematics, etc.

4.—The course of instruction extends through three years, of which one and a half years are employed in preparatory studies, and the remaining one and a half years, in special studies and technical work.

5.—Only day scholars are received into this department. Instruction is given gratuitously, and the students are not only allowed free use of apparatus belonging to the Institution, but are also provided with chemicals.

6.—For admission into the institution applicants must be above eighteen years of age, and must pass a satisfactory examination in Reading and Composition in the Japanese Language, and also Arithmetic. But each applicant may be subject to further examination if it is deemed necessary.

7.—The students are to undergo two regular examinations a year, and if the examination mark of any student falls below twenty per cent. he will not be allowed to remain in the Institution another term.

8.—When a student has completed his course, he will have to pass a final examination, and if his examination proves satisfactory, he will receive from the Institution a certificate, testifying as to his qualifications.

PREPARATORY AND SPECIAL COURSES.

FACULTY (1876.)

G. WAGENER.................Arts and Manufactures.
TOYAMA-MASAKAZU, ...Chemistry.
KUMAZAWA-ZENNAN,........Physics and Chemistry.
UYENO-TSUGUMITSU, ...Mathematics.
OSADA-GINZO, ...Practical Arts.
WADA-TSUNA-HIKO, ...Mineralogy.
SHOJI-IKKI, ...Practical Chemistry.
SHIMOAKI-MOTOJIRO, ...Practical Chemistry.

I.—CHEMICAL ARTS.

PREPARATORY COURSE.

FIRST YEAR.

FIRST SESSION.
- Arithmetic.
- Physics.
- Inorganic Chemistry.

Second Session.

Algebra.
Organic Chemistry.
Chemical experiments.
Qualitative Analysis.—Lecture and Laboratory work.
Drawing.

SECOND YEAR.

First Session.

Mineralogy.
Quantitative Analysis.—Lecture and Laboratory work.
Preparation of chemical reagents.
Drawing.

SPECIAL COURSE.

ONE YEAR AND A HALF.

Practical Training in the Manufacture of Chemical Products.

II.—MECHANICAL ARTS.

PREPARATORY COURSE.

FIRST YEAR.

First Session.

Arithmetic.
Physics.
Inorganic Chemistry.

Second Session.

Algebra.
Geometry.
Trigonometry.
Practice in handling instruments.
Drawing.

SECOND YEAR.

First Session.

Mechanics.
Practical training in the Manufacture of parts of Machines.

SPECIAL COURSE,

ONE YEAR AND A HALF.

Practical training in the Manufacture of Mechanical Products.

SYLLABUS OF SUBJECTS.

I.—ENGLISH LITERATURE, RHETORIC AND LOGIC.

The study of the English Language and Literature includes the origin, developement, grammar and composition of the English Language; also the origin, developement and characteristics of English Literature, marking the growth of the language and literature, and the influences which produced the changes and improvements therein.

Under Rhetoric will be studied the systematic arrangement of the facts and arguments relating to a given subject; the division of the subject according to a recognised method, and the ornaments of a good prose style; figures of speech; beauties of style; elocution; taste; criticism.

Under Logic is included the whole science of In-

ference, Deductive and Inductive, with occasional lectures on the History of Dialectics.

The student will be required to produce exercises in English paraphrasing, by making abstracts, writing essays, speeches, critiques, reviews, making a *précis*, an index, or inditing formal letters in official or commercial correspondence.

The Text Books are :

Marsh's History of the English Language.
Morley's History of English Literature.
Underwood's Manual of English Literature.
Haven's Rhetoric, or Bain's Rhetoric.
Fowler's Deductive Logic.
Killick's Student's Hand-Book to Mill's Logic.
Shakespeare.

II.—HISTORY AND PHILOSOPHY.

The students who enter the University are expected to be sufficiently instructed in the general outline of Universal History. They are occupied during the first term of the first year in the careful study of English History, using the Student's Hume as a text-book. The second term is employed in a similar manner on Chambers' History of France. Essays on given topics are required.

During the whole of the second year attention is given to the Philosophy of History, the various aspects being treated by the Professor in lectures, of which the students take notes, and upon which they prepare written essays.

The first term of the third year is occupied with Mental Philosophy, and the second term with Moral Philosophy, the students using Dr. Haven's Treatises as text books; but also expressing themselves in original Analysis and Classification. Essays are likewise prepared and criticised.

III.—MATHEMATICS.

In the general course the Mathematical instruction is of an elementary character, designed to give a sufficient training to the student to enter any one of the special courses. In the first year Algebra is carried through to the General Theory of Equations, and the elements of Geometry are also mastered.

During the second year Algebra and Geometry are both finished. During the third year Trigonometry, Conic Sections, and Coordinate Geometry are completed.

Higher Mathematics is pursued by the students of the special course in Engineering.

IV.—PHYSICS.

The instruction in Physics is given in the second and third years of the general course, and in the first and second years of the special courses in Chemistry, Engineering, etc.

I.—General Course.

The aim of the instruction connected with the general course is the acquisition by the student, of such a knowledge of the science as should be in the possession of every educated, and especially, of every professional man.

The whole subject is first gone over in a series of familiar lectures or conversations, illustrated with experiments; the student being provided with suitable text books, upon which, together with the lectures, he is frequently examined. He becomes familiar with the language of the science, witnesses the most important actions of the forces of nature, and learns something of their accepted explanation. A year is devoted to this more general and cursory view.

The student is presumed to have now gained sufficient knowledge of Mathematics to enable him to study to advantage some of the theoretical principles of Dynamics, (Statics and Kinetics), in their application to the Mechanics of solids, liquids and gases; and his attention is given to these subjects during the first term of the third year of the general course of studies.

The second term of the same year is devoted to the

various subjects which are grouped under the head of Cosmical Physics. These subjects are :—

The motions of the heavenly bodies.
Universal gravitation.
The light of the heavenly bodies.
Atmospheric Phenomena of Light.
Terrestrial temperatures.
The pressure and currents of the atmosphere.
Hydrometeorology. Clouds, rain, snow, hail, &c.
Atmospheric Electricity.
Terrestrial Magnetism.

II.—Special Course.

The object of the special course is two-fold; 1st, the more minute and detailed study of the subjects which follow Mechanics with the application of mathematical methods: and 2nd, the acquisition of skill in physical manipulation, by practical work in the physical laboratory.

In the first year lectures are given on Acoustics, Heat, Light, Electricity and Magnetism. The construction of physical formulas, and their use in the solution of practical problems, receive particular attention.

In the second year the student enters the laboratory, and learns to use different instruments, and to perform a variety of experiments, in which he is required not only to observe, but also to measure, as far as possible, the action of the various forces of nature.

Physical laws are tested by comparing observed with computed results. Systematic investigations of particular subjects are pursued and all valuable processes and results are recorded.

V.—ZOOLOGY AND BOTANY.

Two years of the course are allotted to these subjects. Much effort is now being expended in collecting and assorting materials for illustrating the Natural History of Japan. The students are themselves encouraged, and instructed to make collections of both Zoological and Botanical specimens. The works by Japanese authors, in which these subjects are treated, are examined, and the students directed to them for information. It is believed that this course, by illustrating the subjects with familiar and native specimens, will greatly aid the student in obtaining a clear apprehension of the subject.

VI.—MINERALOGY.

Crystallography, as an introduction to Mineralogy, is begun in the first half of the last year of the general course. This subject is taught with the aid of a large collection of crystal models, in wood and glass,

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In the Junior year, the students of the

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s. The practical exercises in the class room

continued, but the student is required to perform

for himself all the necessary operations to determine physical properties; hardness, streak, crystalline form, specific gravity, blow pipe reactions, etc.

VII.—GEOLOGY.

In the second year of the special course Geology will be taught. The lectures are mainly devoted to historical Geology, after Physiographic and Dynamical Geology as well as Lithology and Paleontology have been treated as preparatory parts of the proper subject.

The lectures on historical Geology are explanatory of the character of the materials of the different formations from the oldest to the latest; they describe how these materials are arranged and by what organic remains they are characterized.

Besides this, the student gets information as to the distribution of the different chronological groups; he is instructed what deposits of useful minerals occur in them; and at certain times in recapitulating a series of formations a general picture of the changes the earth has undergone during a Geological age will be drawn.

When these subjects have been finished, lectures on

the Geology of Japan, particularly on that of the main island are to be delivered.

The student receives at once some knowledge of the most important principles of Geological surveying; a number of diagrams, sections and tabular views illustrating the lectures are always accessible to the students. The college possesses Lithological, Paleontological, and Geological collections, with specimens from all parts of the world. A special Japanese collection geographically arranged illustrates the last part of the course.

During the summer vacation a few of the best students of the classes are allowed to accompany the professor on a part of his journey into the interior.

VIII.—MINING.

Lectures on Mining follow in course those on Geology, being delivered to the scientific students of the Senior class. The time devoted to this subject being short the treatment is of necessity quite elementary, but includes detailed description of Japanese methods of mining, compared with the theory and practice of other countries.

their special course. Machine Drawing and Graphic calculation are studied under the Professor of Mechanical Engineering. Topographical Drawing is a part of the instruction in Civil Engineering.

X.—LAW.

It has been deemed expedient to modify in some measure the course in Law published in the last Calendar. These alterations have been made in order to give greater weight to the study of present and past Japanese Law, and to that of Chinese Law from which Japanese Law takes its rise. These studies will be pursued under Professors during three years, and will in themselves form a regular curriculum.

The following is an outline of the Course :—

FIRST YEAR.

In the First Year will be studied—(*a*) The Law of Real and Personal Property. (*b*) The Law of Contracts (with the subordinate topics of Agency, Bills, Bailments, Insurance, Partnership, Sale). (*c*) The Law of Crimes with the Law of Civil Injuries. (*d*) Constitutional Law, which will be an Elective Study.

SECOND YEAR.

In the Second Year special attention will be given to the Practice of Law, including the Law of Pro-

cedure in its various branches, viz:—Civil Proceedings, Criminal Proceedings, Chancery Proceedings and Admiralty Proceedings. The students will also continue the studies as opportunity allows, begun in the First Year, and Roman Law will be an Elective Study.

XI.—GENERAL CHEMISTRY.

Inorganic Chemistry is taught in the third year of the general course.

The subject is introduced by a study of the general laws of chemical combination and decomposition, and is followed by a description, illustrated by numerous experiments, of the elementary substances and their most important compounds.

Connected with this department is a laboratory provided with all the necessary apparatus and chemi-

cals, where the student is required to repeat the experiments previously performed by the Professor in the lecture-room; thus enabling those who are preparing to enter the special chemical course, to do so with some preliminary knowledge of chemical reactions and manipulation.

The students of the Chemical Section are instructed in Organic Chemistry, during the first year of their special course.

Those carbon compounds which are of importance, either in the arts and manufactures, or have a special theoretical interest, are treated of as fully as possible, and the lectures are illustrated with numerous experiments.

Books of Reference:—Bloxam's Chemistry, Fownes' Manual of Chemistry, Schorlemmer's Chemistry of the Carbon Compounds, and Watt's Chemical Dictionary.

XII.—ANALYTICAL CHEMISTRY.

Instruction in this subject is given mainly by practical work in the chemical laboratory, extending throughout the three years of the special course in chemistry.

The attention of the student is first directed to the general properties of the metallic and non-metallic elements, practice in manipulation being afforded by

the preparation of various chemical substances. Afterwards special attention is paid to those properties of the elements which serve for their detection in the course of analysis. The progress of the student is frequently tested by giving to him substances for examination, a written report of the analysis being presented to the Professor. At the conclusion of the systematic study of the elements, the student proceeds to examine qualitatively the composition of various natural and industrial products.

Practice is next given in quantitative analysis, commencing with the simplest cases, such as the determination of the constituents of a simple salt, the composition of which is known to the Professor. When the student has shown his ability to obtain trustworthy results, he is allowed to proceed with the analysis of natural minerals and artificial products. This will include the assaying of coals and ores, ultimate and proximate organic analysis, detection of adulteration, especially in articles of food, and detection of poisons.

XIII.—CHEMICAL TECHNOLOGY.

The lectures on this subject are given during the second and third years of the special course in Chemistry. In the second year the following subjects are taken up, and the students, whenever it is possible,

are shown the manufacturing processes described in the lectures. The subject is illustrated by diagrams, and by specimens of manufactured articles.

Fuel and its applications.

Wood. Peat. Coal.

Products of combustion and decomposition.

Charcoal. Coke.

Gas. Artificial illumination.

Tar, and bodies derived from it.

Other waste products of the manufacture of coal gas.

Acetic acid. Naphtha.

Mineral oils; application to heating and lighting purposes.

Nitre. Nitric acid.

Sulphur, distillation and purification.

Manufacture of Sulphuric acid, Salt-cake, Carbonate of Sodium.

Hydrochloric acid, Chlorine, Bleaching powder.

Salts of Potassium and Sodium.

Magnesium and Aluminium.

Bromide and Iodine.

The second part of the course includes the undermentioned subjects.

Colouring materials, mineral and organic.

Bleaching.

Dyeing and Calico printing.

Glass, Pottery and Porcelain.

Mortars and Cement.

Sugar refining.

Brewing, and manufacture of wine.

Animal and vegetable oils and fats. Soap, Candles, etc.

Explosive materials: gunpowder, gun-cotton and nitroglycerine.

XIV.—METALLURGY.

The lectures on Metallurgy commence with a general account of the principal metallurgical processes, and a consideration of the refractory materials used in the construction of furnaces and of the fuel employed for the reduction of the metal from the ore.

A detailed account of the processes employed, and of the furnaces used, in the reduction of the most important metals will next be given. These will be described in the following order, attention being directed to the methods most applicable to this country.

Iron and Steel.

Copper; Zinc; Tin; Lead.

Silver; Gold; Platinum.

Mercury.

Nickel and Cobalt.

The lectures are illustrated by a collection of diagrams, and models of furnaces, and specimens of ores, metals, and slags.

Practical instruction in Assaying is given to third year's students in the Metallurgical Laboratory, which is fitted up with all the necessary apparatus.

XV.—MECHANICAL ENGINEERING.

Before entering upon the special studies in this department, the student must have completed the general course of study or must pass an examination in equivalent studies; especial weight being given to the following subjects:—

The English Language.
Mathematics.
Geometrical and Free-hand Drawing.
Physics and Inorganic Chemistry.

FIRST YEAR.—JUNIOR CLASS.

In the first year of the course the pupils will attend to the following subjects of study.

1. They will continue Geometrical Drawing as applicable to machinery, the exercises being selected as far as possible to familiarize them with the projection, on different planes, of elementary parts of machi-

nary. They will also devote considerable time to the study and practice of the various graphic methods which are applicable to many classes of Engineering calculation. The subject of Graphic Calculation is treated in the following order :—Graphic Arithmetic, Graphic Algebra, Grapho-Kinetics, and Grapho-Statics ; in the last division of the subject numerous practical applications being made to the calculation of the strength of parts of machinery and of bridge-work.

2. They will pursue a more advanced course of study in Mechanics and Mechanism. The home exercises for this class will plentifully illustrate the numerical results of all propositions and formulæ explained in the lectures.

3. They will at the same time enter upon the study of the Strength of Materials. They attend the Metallurgical lectures given in the Chemical course (1st Year), and in the special class on strength of materials the mechanical processes to which the materials used by engineers are subjected in the course of their commercial manufacture, are described with reference to the influence which those operations exert upon the final prices, and upon the physical properties of which the Engineer has to take account. Attention is drawn to the comparative costs of different shapes and sizes, and to the fluctuations in the market prices of the various materials. In order to gain a more intelligent familiarity with the subject, the students will make practical tests with different

Testing Machines, and will calculate the strength, etc., from the results of their experiments. The materials experimented on will for the most part be Japanese products.

SECOND YEAR.—MIDDLE CLASS.

The following is an outline of the second year's course of study :—

1. The students will apply the principles of the Strength of Materials, and the experimental data upon which they rest, to the practical designing of Boilers, Bridge-work, and a few examples of Machinery.

2. They will also be made thoroughly acquainted with Thermodynamics, developing in full detail those portions of the subjects which have practical applications. First is considered the Generation of Heat in Furnaces, or Combustion of Fuel. After this Furnace and Boiler efficiency. Next Mathematical Thermodynamics, and lastly the applications of Thermodynamic principles to the practical calculation of the efficiency of Steam Engines and Air Engines. This last part of the subject will include descriptions of the methods of Testing Steam Engines.

3. They will also attend lectures explaining the theory of Frictional Efficiency of Machines and describing the construction of the frictional parts of machines. In the second part of the year they will learn the most important details of work-shop prac-

tice, and this will include the calculation of the power required to drive various machines.

THIRD YEAR.—SENIOR CLASS.

During the third year the work of the students will have an entirely practical bearing.

1. The designing of different forms of Land, Locomotive and Marine Engines, and of Propellers, will be explained in full detail, and all necessary calculations, including estimates of cost, and drawings, will be made by the students themselves. If there is found sufficient time, the design of Machine Tools and Ship-building will be treated of in the lectures.

2. The machinery of Water-works, Harbour-works, and Town-Drainage, will occupy a part of the year.

3. Most of the students' time, for a large part of the year, will be spent in the designing office, and an extended course of reading upon technical subjects will be prescribed. Both the practical work, and the reading prescribed for each student, will have special reference to the special branch of engineering intended to be pursued.

XVI.—CIVIL ENGINEERING.

Civil Engineering is pursued by the students of the Engineering section, in a course parallel to that in Mechanical Engineering. It will be treated in the following order:—

1. During the first year, Land Surveying will be fully treated, including the use of field instruments. Practical surveys will be made, and the necessary drawings and computations executed.

2. Levelling is also taught during the year, as well as the methods required for Topography, the use of the plane table, etc.

3. In connection with the preceding subjects, the students are trained in the methods of making plots and maps of the lands surveyed, and in the systems of conventional symbols used in Topographical Drawing.

The second year is occupied with the following subjects:—

1.—Common roads, including location and construction; material of road-beds, street pavements, &c.

2. Railway surveying, including the reconnaissance of a railway line; levelling, and laying out railway curves, laying out and computing the excavations and embankments, and making detailed drawings and specifications for the work to be executed.

3. The study of the material used in engineering structures, viz: wood, brick, stone and metals, together with mortars and cements.

4. Engineering structures in wood, iron and masonry; bridges, stone, wood, cast-iron, and suspension.

During the third year, the work of the student is expended on the subjects connected with Geodesy and Hydraulic Engineering.

1. Geodesy will be taught by a series of lectures, explaining the methods of trigonometrical surveying; geodetical astronomy, and problems connected with the figure of the earth.

2. The construction of canals, canal-locks, aqueducts, and irrigation and sewage works.

3. The improvement of the channels of navigable rivers; the protection of their banks.

4. Sea-coast improvements, including the construction of harbours, docks, piers, etc.

The treatment of all these subjects will be of a practical character, and will be accompanied with exercises in the use of instruments, and in making drawings and computations.

SECTION FRANÇAISE.

Le but de la section Française est de former des professeurs capables d'enseigner la physique dans tous ses développements. Aussi les cours de Physique sont ils nécessairement accompagnés de cours de Mathématiques et de Mécanique sans lesquels les nouvelles théories physiques ne pourraient être exposées.

PROGRAMME DES COURS DE PHYSIQUE.

I.—PHYSIQUE.

COURS PRÉPARATOIRE.

Physique Élémentaire.

But de la physique.
Propriétés générales des corps.
Notions élémentaires de mécanique.

Pesanteur et Hydrostatique.
Chaleur.
Magnétisme.

PREMIÈRE ANNÉE.

Physique Élémentaire.

Electricité statique.
Electricité dynamique.
Electro-Magnétisme.
Acoustique.
Optique géométrique.

DEUXIÈME ANNÉE.

Physique supérieure.

I.—Pesanteur.

Complément à la théorie du pendule.
Identité de la pesanteur et de l'attraction universelle.
calcul des éléments de la variation de la pesanteur à la surface du globe terrestre.
Complément à l'hydrostatique des gaz.—Baromètres enregistreurs, corrections barométriques, mesure des hauteurs au moyen du baromètre. Lois de la solubilité des gaz dans les liquides.

II.—Chaleur.

Mesure des températures : 1° par la dilatation des corps solides, liquides ou gazeux ; 2° par les tensions de dissociation des corps composés.

Dilatation des corps solides amorphes ou cristallisés (octaèdre et ellipsoïde des dilatations), des liquides, des gaz.

Chaleur rayonnante. Lois du refroidissement de Dulong et Petit.

III.—Magnetisme.

Equation des courbes magnétiques.

Expériences de Gauss.

IV.—Electro-dynamique et Electro-Magnetisme.

Formules élémentaires de l'action des courants sur les courants et de l'action des courants sur les aimants. Conséquences.

V.—Manipulations.

TROISIÈME ANNÉE.

Physique Supérieure.

Cette année est consacrée à une étude toute nouvelle, exigeant des connaissances déjà étendues en calcul infinitésimal.

I.—Acoustique.

Propagation d'un mouvement vibratoire dans un milieu homogène.

Composition des mouvements vibratoires.

Application à l'étude de la propagation du son. Tuyaux sonores, cordes, et plaques vibrantes.

II.—Optique.

Des vibrations de l'éther. Surfaces d'onde et d'élasticité.

Réflexion et Réfraction des ondes lumineuses.

Méthodes de Fizeau et de Foucault pour la détermination de la vitesse de la lumière.

Interférences dans la lumière naturelle :

Franges des miroirs de Fresnel. Biprisme ; Anneaux de Newton :

Diffraction et Réseaux. Mesure de la longueur d'onde.

Polarisation rectiligne. Interférences, polarisation elliptique.

Polarisation chromatique. Franges et lignes neutres dans les cristaux uniaxes et biaxes.

Polarisation rotatoire. Saccharimétrie.

III.—Manipulations.

II—MATHEMATIQUES.

COURS PRÉPARATOIRE.

Arithmétique.

Géométrie.

Algèbre.

Trigonométrie.

Géométrie descriptive.

PREMIÈRE ANNÉE.

Algèbre complémentaire.

Binome de Newton. Séries. Logarithmes algébriques. Théorie des Dérivées. Théorie et résolution des équations algébriques et transcendantes.

Géometrie analytique plane

Ligne droite. Cercle. Courbes du second degré. Théorie des centres, diamètres, tangentes, asymptotes, foyers. Construction des courbes en coordonnées cartésiennes et polaires. Similitude. Enveloppes. Sections coniques et cylindriques.

Géometrie analytique de l'espace.

Ligne droite. Plan. Sphère. Etude des surfaces du second ordre. Ellipsoïde. Hypelboloïde et cône asymptote. Paraboloïde. Surfaces coniques et cylindriques. Surfaces de révolution.

Géometrie descriptive.

(Théorie et Epure.)

Plans tangents aux surfaces coniques et cylindriques, et aux surfaces de révolutions. Sections planes du cône, du cylindre, d'une surface de révolution. Intersection de deux surfaces coniques et cylindriques. Intersection de deux surfaces de révolution dont les axes se rencontrent. Intersection de deux surfaces quelconques du second ordre. Construction des ombres.

DEUXIÈME ANNÉE.

Mathématiques Supérieures.

Algèbre Supérieure.

Théorie des déterminants. Théorie de l'élimination.

Calcul différentiel.

Différentielles des divers ordres des fonctions d'une seule variable ou de plusieurs variables indépendantes. Théorie des maxima et minima. Théorie des courbes planes, des courbes gauches, et des surfaces courbes. Etude des lignes tracées sur les surfaces courbes.

TROISIÈME ANNÉE.

Mathématiques Supérieures.

Calcul intégral.

Intégration des différentielles. Théorie des intégrales définies. Application à la quadrature et à la rectification des courbes. Théorie des intégrales multiples. Application à la quadrature des surfaces et à la cubature des volumes.

Théorie générale des équations différentielles du premier ordre et des ordres supérieurs à deux variables. Intégration des équations aux dérivées partielles.

Théorie mathématique de la Chaleur.

III.—MECANIQUE.

PREMIÈRE ANNÉE.

Mécanique Élémentaire.

Eléments de statique.

Eléments de cinématique.

Eléments de dynamique : Travail des forces.

Des machines les plus simples : Leviers, balances, poulies, moufles, treuil, plan incliné. Lois du frottement et applications.

DEUXIÈME ANNÉE.

Mécanique Rationnelle.

L'étude de la cinématique, qui ne peut se faire sans calcul différentiel, est reservée pour la 2e partie de l'année, alors que le cours de calcul infinitésimal sera déjà avancé. Chaque théorie sera suivie immédiatement d'applications.

I.—Statique.

Principes de statique.

Composition des forces appliquées à un même point. Moments.

Composition des forces parallèles. Moments. Centre de gravité.

Composition d'un système quelconque de forces. Moments. Equations d'équilibre.

Réduction des forces par les couples. Théorie des couples.

Équilibre d'un point ou d'un corps solide assujetti à certaines liaisons.

Équilibre des forces appliquées à des cordons. Pont suspendu.

Équilibre d'un fil flexible. Chaînette.

II.—Cinématique.

De la vitesse et de ses composantes.

De l'accélération et de ses composantes.

Des accélérations d'ordre supérieur.

Du mouvement relatif :

1°. Déplacement d'un plan dans un plan. Centre instantané de rotation. Bases et roulettes.

2°. Déplacement d'un solide autour d'un point fixe. Axe instantané de rotation. Bases et roulettes sphériques.

3°. Déplacement quelconque d'un solide. Axe instantané de rotation et de glissement. Bases et roulettes coniques.

De l'accélération résultante dans le mouvement relatif. Théorème de Coriolis.

De la composition des mouvements.

TROISIÈME ANNÉE.

Mécanique Rationnelle.

I.—Dynamique.

1° Dynamique du point.

Principes.

Relation entre la force et l'accélération.

Mouvement rectiligne. Tautochronisme.

Mouvement curviligne. Mouvement des projectiles.

Intégrales mécaniques.

Equation aux forces vives. Surfaces de niveau.

Travail d'une force.

Mouvement d'un point sur une courbe. Courbes brachistochrones. Pendule.

Principe des aires.

Mouvement d'un point sur une surface.

Mouvement d'un point libre. Forces centrales et applications à l'Astronomie.

Mouvement relatif.

2°. Dynamique des systèmes.

Mouvement du centre de gravité.

Principe de la conservation des moments.

Principe des forces vives.

Moment d'inertie.

Mouvement d'un corps solide autour d'un axe.

Mouvement d'un solide autour d'un point fixe.
Mouvement d'un solide libre.
Des percussions.
Du choc des corps.
Principe des vitesses virtuelles.

II.—HYDROSTATIQUE ET HYDRODYNAMIQUE.

III.—THEORIE DES MACHINES.

FINAL EXAMINATION, 1876.

EXAMINATION QUESTIONS.

MIDDLE LAW CLASS.

EQUITY.

1. Is there any thing in Roman Law corresponding to the division of Common Law and Equity?

2. Trace the growth of the Chancery jurisdiction.

3. What is meant by "trust"? From what circumstances did the system of trusts take its rise.

4. State the difference between a mortgage under Common Law and that under Equity.

5. Trace the rise of the power given to a wife over her separate property.

6. In what cases do the Courts of Equity assume jurisdiction in matters of account?

7. What is meant by Election? How does the doctrine of election in Roman Law differ from that of English Law?

8. What is meant by putting oneself in *Loco Parentis?*

W. E. GREGORY.

Agency.

1. Explain the maxim "Qui facit per alium facit per se."

2. What is the difference between a general and a special agent?

3. Explain the distinction between the liabilities of public and private agents.

4. What is the rule laid down in "Coombe's" case with reference to the execution of the authority of an agent?

5. Quote the facts and judgment in the case of Smart v. Hbury.

6. Enumerate the chief rights of an agent against the principal.

7. What is meant by ratification? What are the conditions necessary?

8. In what various ways may the contract of Agency be dissolved?

W. E. Grigsby.

Partnership.

1. Define partnership. Explain the phrases "nominal," "dormant," "quasi," partnership.

2. Give the outline of the case of Cox v. Hickman

3. What is the difference between partnership and co-ownership?

4. One partner of a firm releases the debts due to the firm. Is this release good against the other partners?

5. What effect has the change of persons upon the existing rights and liabilities of a firm?

6. Describe the nature of an account. What defences can be brought on a suit for account?

7. Explain the maxim "jus accrescendi inter mercatores locum non habet."

8. What was established in the case *ex parte* Ruffin?

W. E. Grigsby.

JUNIOR LAW CLASS.

Roman Law.

1. What is meant by Fidei-commissa? To what are they analogous in English law?

2. Translate and explain: (1) "Legari autem illis solis potest, cum quibus testamenti factio est." (2) "Falsa demonstratione legatum non perimi." (3) "Quantitas autem patrimonii ad quam ratio legis Falcidiae redigitur mortis tempore spectatur."

3. What is meant by an impossible condition? What is the effect of it (1) in a Legacy, (2) in an Obligation?

4. Trace the gradual steps by which a mother was allowed to succeed to the property of her children?

5. What was the contract "verbis"? To what kind of contract does it correspond in English law?

6. Give the chief incidents of contract of sale.

7. Enumerate the obligations Quasi ex contractu, and show what is meant by the term.

8. Explain and comment on the phrase "Prætor non facit heredem."

W. E. Grigsby.

International Law.

1. How does International Law differ from Law properly so called?

2. About what period and under what circumstances did International Law take its rise?

3. What is meant by the right of Intervention? Illustrate your answer by referring to the affairs of Mexico in 1861.

4. Explain the phrases, "Lex loci rei sitæ;" "Lex Domicilii;" "Lex fori."

5. Explain the principle of exterritoriality, with reference to the public ships of a nation.

6. Give an account of the controversy between England and the United States concerning the impressment of seamen.

7. What is meant by Extradition? Give the facts of Anderson's case.

8. How far does the territorial jurisdiction of a nation extend?

W. E. GRIGSBY.

CRIMINAL LAW.

1. What are the elements which constitute a crime?

2. In what way can a person render himself responsible for the acts which he did not commit?

3. What is the great distinction between murder and man-slaughter?

4. Give and analyze the definition of Burglary.

5. Show in what respect the strictness of the Common Law doctrine of larceny led to legislation on the subject.

6. In what different ways may a libel be viewed?

7. What must be proved on an indictment for Bigamy?

8. Explain the distinction between Felony and Misdemeanor?

W. E. GRIGSBY.

Law of Real and Personal Property.

1. What is the difference between real and personal property?

2. What is meant by "chattels real;" "incorporeal hereditament;" "gavelkind;" "borough-English;" "base-fee;" "mortgage;" "tenure by grand sergeantry?"

3. Explain the difference between an executor and an administrator.

4. Define Copyright. Quote the provisions of the present law on the subject.

5. Give the form of a joint and several bond.

6. What effect is produced in the following cases? (1) an assignment of a chattel to A for 1,000 years; (2) a gift to A of a landed estate; (3) a devise to A, a married woman, of less than £200.

7. What is meant by a "Donatio mortis causa?" Explain its incidents.

8. Give (1) rights of husband over the estate of wife; (2) rights of wife over the husband's estate.

W. E. Grigsby.

Constitutional Law.

1. What is Allegiance? State the several kinds; where and to whom is it due and by virtue of what law?

2. What event occurred in the reign of Edward 1st which proves that the "King's law follows his allegiance out of the local limits of the laws of England?"

3. Where do we find the fundamental rights and privileges of the subjects of England and the corresponding duties of the Crown set forth?

4. Show that the writ of Habeas Corpus is a sufficient guarantee of the subject's liberty; (*a*) what ensures its efficiency, (*b*) available against whom, (*c*) is grantable in what cases, where and by whom?

5. What formidable pretensions were made by James 1st and Charles 1st to a complete system of extra-parliamentary taxation in virtue of their prerogative?

6. What was the nature and force of a royal proclamation? Show what unconstitutional abuses gradually resulted from its exercise?

7. In what does an ordinance essentially differ from an act of parliament? How do you account for some ordinances having the name and force of Statutes, as Statute of Quia Emptores, Merton, etc?

8. Give a summary of the case of the Seven Bishops, and the legal principles decided in it.

H. N. Allin.

Integral Calculus.

1. Explain the cases in which expressions of the form A $x^m\ (a + bx)^n dx$ may be integrated.

2. Explain the use of the *Arbitrary Constant* and *Integration between limits.*

3.—Write the integrals of the following expressions :—

$$Sin\ x\ dx\ ;\ \int \frac{dx}{sin^2 x},\ \int \frac{du}{\sqrt{2u-u^2}}\ \int \frac{du}{1+u^2}$$

4. Explain the integration of *Rational Fractions* and apply to $\frac{3x^2-1}{x^3-x}dx.$

5. Explain the integration of *Total Differentials* of the *first* order, and "Euler's Test."

6. Explain the integration of *Differential Equations* containing the higher powers of *dy* ; and the particular cases of these equations that may occur.

7. Explain the *Rectification Curves* and apply to the *Circle.*

8. Explain the *Quadrature of Curves* and apply to the *Cycloid.*

J. R. Wasson.

Differential Calculus.

1. Write the differentials of the following general expressions, in which v or s in the second member represents any function of x; and, in those cases which admit of such translation, write the rule applicable to the case.

Examples. $u = v^m$: $u = \frac{s}{v}$: $u = log.\ v$: $u = a^v$: $u = v^s$: $u = sin\ v$: $u = tang.\ v$: $u = sin^{-1} v$: $u = f(x, y, z, \&c.)$

2. Define what is meant by a vanishing fraction. Give the Algebraic and Calculus rules for finding the true value of such fractions and apply the latter rule to the expression $\frac{a^x - b^x}{x}$ to find the value when $x = o$ and to the expression $\frac{1 - sin\ x}{cos\ x}$ to find true value for $x = \frac{\pi}{2}$

3. Define the Maximum and Minimum states of a function of a single variable and give the rules for determining these states.

Example.—Required the maximum rectangle that can be inscribed in a given circle.

4. Discuss the convexity and concavity of curves.

5. Explain the advantages of regarding the differential of the independent variable as infinitely small.

6. Deduce the equation and the differential equation of the cycloid.

7. Discuss the equation $y=b + c (x-a)^m$ supposing first—*m* to be entire and even.
second—*m* to be entire and odd.

8. Deduce the expressions for the Tangent, Normal, Sub-tangent and Sub-normal to curves generally; and apply to the common parabola given by the equation $y=2 p x$.

J. R. Wasson.

Land Surveying.

1. Explain the construction and mode of using *Surveyors' Compass;* also name some of its chief defects.

2. Explain what is meant by the *declination of the magnetic needle*, and describe some of the variations which this declination undergoes.

3. Explain any two methods for obtaining the declination and of determining a true meridian.

4. Explain the construction and some of the principal uses of a table of latitudes and departures.

5. Explain the construction of the *Plane Table* and its use in surveying.

6. Describe the *Engineer's Level* and its adjustments; the method of using it in the field, and of keeping the notes for general purposes.

7. In triangular surveying, explain the problem for "*reduction to the centre.*"

8. Balance the work and find the area from the following notes.

Station.	*Bearing.*	*Distance.*
1	N. 35° E.	2.70
2	N. 83½ E.	1.29
3	S. 57 E.	2.22
4	S. 34¼ W.	3.55
5	N. 56½ W.	3.23

J. R. Wasson.

Mechanics.

1. Define the Hodograph of a motion. What curve is the hodograph of a compound harmonic motion which has just two components which are at right angles to each other, of equal period and of different amplitudes? Make a sketch roughly to scale of the hodograph of the compound harmonic motion supposing the one amplitude to be 2 ft and the other 1 ft, and the period of complete vibration to be 1 second.

Scale ½ ft = a velocity of 1 ft per second.

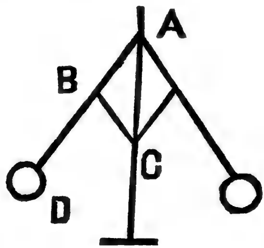
2. In direct Impact of two bodies, what is the criterion by which you can decide which of the two will give up energy to the other body? Express in algebraic language the amount of energy exchanged when no internal energy is generated. Point out the

results of the formula in the most important special cases.

3. Distinguish between a "power" governor or regulator, and a "speed" governor or regulator. Illustrate by examples the difference of the circumstances in which each kind of governor should be used.

Give the general equation applicable to all forms of rotating speed-gravity-governors Give the special form of the general equation for the case of the gravity governor in which the fixed points of suspension are below and in line with the centre of the spindle, and the monkey-brass above.

Reduce this formula for the case AB=BC and DB=2 BA.



4. A water-pipe with a co-efficient of friction F= .008 and a gradient of 1 in 90, has to supply 13,000 cubic feet per hour.

What is the requisite diameter? Explain how the formula you use is deduced from the energy equation (loss of potential energy of gravitation).

R. H. SMITH.

STRENGTH OF MATERIALS.

1. What are the general characteristics of timbers as distinguished from metals? In answering this question, leave out of consideration all properties which have no bearing upon the usefulness of the materials in the mechanical industries. Illustrate the subject by giving some examples of structures in which timber is preferable to metal, and by pointing out circumstances which will make timber sometimes preferable for structures in which timber and metal would be equally good if their efficiency as materials alone were considered.

2. Describe the differences between the various qualities of steel used by engineers, and the corresponding different classes of structures, machines and tools for which they are used.

3. Give the mathematical investigation of the deflection of a beam under transverse loads. The total deflection is partly due to shearing stresses and partly due to the deviation from their initial parallelism of the plane cross-sections, the latter part of the whole deflection being usually much larger than the former. Can you suggest a simple reason which will explain this greater importance of the latter part without the help of any symbolical equations?

4.—Explain the mode of obtaining the equations which serve to calculate the proper diameter of shafts exposed only to torsion.

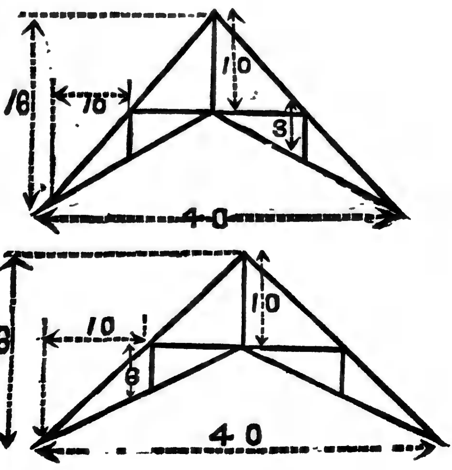
A mill is driven by a pulley 6 feet diameter, and the driving pull of the belt is 3,000 lbs. What ought the diameter of the wrought iron shaft to be? What is the horse-power required at 25 revolutions per minute?

A drilling-machine which requires $1\frac{1}{4}$ horse-power to drive it, receives its motion from a counter-shaft which makes 55 revolutions per minute. What ought the diameter of this shaft to be?

R. H. Smith.

Graphic Calculation.

1.—There are two roofs of the same span 40 feet, and the same "rise" 16 feet, but the bracings of which are different, as shewn in the accompanying sketch.



The stresses are produced by the weight of the roof and the pressure of the wind. The roof weighs 18 lbs. per sq. foot of the sloped surface and the trusses are placed 6 ft. apart. The wind acts only on one side of the roof and blows downwards inclined to the horizontal at an angle of 30 degrees. Its pressure amounts to 25 lbs. per sq. foot of roof surface. Draw the two stress-diagrams, and measure the stresses.

2.—Explain how the motion of any body constrained by any means to move in a certain definite manner, always in one plane, may be expressed by the rolling of a cylindrical surface supposed fixed to the moving body upon another cylindrical surface supposed fixed in the space through which the body is moving; i.e. fixed to the foundation.

In what cases do these cylindrical surfaces become circular cylinders?

R. H. Smith.

MIDDLE AND JUNIOR CHEMISTRY CLASSES.

Chemical Technology.

1. Describe briefly the process of making and concentrating oil of vitriol. Give the usual dimensions of the chamber employed, and say whether you think the dimensions are the best that could be adopted, giving reasons for your answer.

2. What means are adopted to prevent the waste of the oxides of nitrogen in the sulphuric acid process? Point out the relative advantages of the two methods of denitration, by steam, and by hot sulphurous acid gas.

3. How is common salt obtained from sea-water?

4. Mention the most common defects of hydrochloric acid condensers. How would you determine the proportion of acid gas retained in the condenser, and from that calculate the leakage?

5. Describe Hargreaves' method of preparing "salt-cake" without the use of oil of vitriol. Compare it with the common method.

6. What is meant by a "24-stone ball"? Give an average mixture for such a ball.

7. Give an account of Weldon's process for the recovery of manganese from the still liquors in which magnesia is the agent employed. In what respects is this an improvement upon the "lime process"?

R. W. ATKINSON.

MIDDLE CHEMISTRY CLASS.

Quantitative Analysis.

A sample of glass was given, the following constituents to be determined quantitatively.

Aluminium.
Calcium.
Potassium.
Silica.

R. W. Atkinson.

JUNIOR CLASS (DIVISIONS A AND B.)

Qualitative Analysis.

A mixture was given for examination, containing

Plumbic sulphide.
Uranic nitrate.
Calcic carbonate.
Magnesic carbonate.
Potassic chlorate.

DIVISION B.

A solution was given in which the following determinations were to be made.

Barium.
Chlorine.
Solid residue at 110°—120.°

R. W. Atkinson.

Analytical Chemistry.

1. Describe minutely the analysis of one of the following minerals; Pitchblende, Triphyllin, Cerite, Serpentine, Felspar.

2. How do you separate the three metals, Barium, Strontium and Calcium?

3. A solution gives no precipitate with any reagent as far as ammonic carbonate inclusive. What may the solution contain? Describe the mode of analysis.

4. Supposing that a new mineral were given to you for examination, describe carefully all the experiments you would undertake, both physical and chemical, to ascertain its nature.

5. Enumerate the tests for the two metals, Nickel and Cobalt. Describe their exact separation.

R. W. Atkinson.

Organic Chemistry.

1. Give a brief description of the preparation and refining of cane-sugar. How may it be estimated quantitatively? Give its formula.

2. How may grape sugar be estimated quantitatively?

3. How may isomerism in the Aromatic Group be caused?

4. Give the formula and properties of napthalene. Show that it consists of two aromatic nuclei, which have two carbon atoms in common.

5. How is aniline prepared? Mention its isomerides. Write down the formula for rosaniline, and, represent the reactions by which it may be prepared.

6. How is anthracene separated from phenanthrene? How may it be obtained synthetically?

7. What is the chief coloring matter of "madder," and, how may it be obtained artificially?

8. Give the formulas, properties and tests for morphine, strychnine and quinine.

G. J. ROCKWELL.

JUNIOR CLASS.

CHEMICAL AND ENGINEERING SECTIONS.

MAGNETISM AND ELECTRICITY.

1. Define: (*a*) A magnetic field, (*b*) A unit pole, (*c*) An ideal simple magnet.

2. Find an expression for the couple which tends to turn a small magnet in a uniform magnetic field.

3. The strength of the poles of two long thin bars of soft iron held horizontally in the terrestrial magnetic fields is 5.7 absolute units. If two poles of opposite names are 5 centimetres apart, what is the force exerted between them?

4. Describe the experiments by which the moment of a magnet and the intensity of the terrestrial magnetic field may be determined, and explain the necessary formulas.

5. Describe a Daniell's cell: also the arrangements by means of which the difference of potentials between the two poles may be measured, and those by which a constant current may be maintained.

6. State the law of currents induced by the motion of other currents or of a magnet; and give four examples.

7. Define: (*a*) Difference of potentials, (*b*) Work done by electricity.

8. Explain and illustrate by examples the resistance in circuits when arranged in multiple arc and in series.

9. Give the rule for choosing a galvanometer.

10. Define: (*a*) An ohm, (*b*) A farad, (*c*) A megavolt, (*d*) The electro-chemical equivalent of a subs tance

11. If 485 metres of fine copper wire have a resistance of 1 ohm, how much would the resistance of a galvanometer having a resistance of .5 ohm be diminished by a shunt consisting of 5 metres of this wire?.

12. Show how the electromotive force of a Daniell's cell may be calculated from the chemical action which takes place within the cell.

P. V. Veeder.

JUNIOR LAW, CHEMISTRY, AND ENGINEERING CLASSES.

Mental and Moral Philosophy.

1. State the peculiar nature and value of the study of Mind.

2. Trace the successive links between an impression received and an action performed.

3. Give the best classification of the Mental Faculties.

4. How may these Faculties be improved or impaired?

5. What are the points at which Mental Philosophy touches Physiology on the one hand and Ethics on the other?

6. What is meant by "Character?"

7. State the proofs of the Freedom of the Will.

8. Define "Conscience" and "Morality."

9. Where do we find the *data* for the study of Ethics?

10. Enumerate the chief human relations and the duties they involve.

11. What is the *Ultimate Standard* of Right and Wrong?

12. State the various kinds of motives from which men act, and give their relative rank.

Edwd. W. Syle.

GENERAL COURSE.

FIRST CLASS.

English Literature.

1. Name twenty leading English writers since the Revival of Letters, especially such as have influenced the development of the language, and mention their works and characterize their style.

2. Write a short essay upon *studies*. How does Bacon speak of them? And give the meanings of the following expressions: marshalling of affairs—flashy things—studies reach not their own use—natural abilities need pruning by study—to judge wholly by their rules is the humour of a scholar.

3. Give some account of Milton's L' Allegro. What influence had Milton's writings upon the English Language? The meanings of the following: in spite of,—blithe ere glimpse of morn,—towered cities,—could not end,—Euphrosyne,—Hebe,—Cimmerian,—Cerberus,—Hymen,—Elysian.

4. Give qualifiers for the following from Milton:—Mirth—care—liberty—light—dawn—smiles—echo—dinner—darkness.

J. Summers.

Logic.

1. Enumerate and explain the various forms of induction, and distinguish it from colligation of facts.

2. What is the fundamental axiom of induction? And show when induction "per enumerationem simplicem" is valid.

3. Define "Laws of Nature" in the Logical sense.

4. What is a "cause" in logical and in popular language? Define "Law of Causation."

5. What is meant by a "Heteropathic effect?"

6. Mention the various steps to be taken in induction inquiry, and shew what advantage there is in experiment.

7. How many methods of experimental enquiry does Mr. Mill lay down? Distinguish them.

8. What are "Empirical Laws" and "Laws of Nature."

9. Explain the two classes of Hypotheses, and the two kinds of "Progressive effects."

10. What is meant by the "Elimination of chance" and "Analogy"? Explain the "Theory of Probability."

James Summers.

Co-ordinate Geometry.

1. Find an analytical expression for the distance between two points in the same plane.

2. Ascertain whether the lines represented by the equations

$$2y - 4x + 7 = 0$$
$$y - 2x - 3 = 0$$

are parallel or perpendicular to each other.

3. Determine and discuss the general equation of the circle.

4. What is the analytical expression for the distance between two points in space?

5. Discuss the equation of the parabola, showing that the parameter is a third proportional to the abscissa and ordinate of any point of the curve; that the curve is symmetrical with respect to the axis of X., and that the squares of the ordinates of any two points of the curve are proportional to the corresponding abscissas.

W. E. Parson.

Philosophy of History and Guizot's History of Civilization.

1. What is meant by the Philosophy of History?

2. What are our sources of information as to the early history of any country?

3. What are the elementary wants of all human beings; and to what occupations do they give rise?

4. What gives rise to commerce, and to the planting of colonies?

5. Define "Civilization," as applied to ancient as well as modern times.

6. State Guizot's view as to what characterizes modern European civilization.

7. What lessons of warning are to be learned from the English Revolution of 1688?

8. What, from the American of 1776?

9. What, from the French of 1789?

EDW. W. SYLE.

COSMICAL PHSYICS.

Write what you know respecting each of the following phenomena, giving in each case, a description of the phenomenon itself and an account of its cause or causes so far as ascertained.

1. The twilight.
2. Rainbows.
3. The seasons in Japan.
4. The bending of the isothermals.
5. Variations in the quantity of moisture in the atmosphere.
6. Electrical phenomena in showers and in thunder-storms.

7. **Secular variations of magnetic declination.**

8. **Describe the proper construction of lightning rods and give the conditions of safety.**

P. V. Veeder.

Botany.

1. Describe briefly the Organs of Respiration and Digestion in Dicotyledonous Plants, and the manner in which their Functions are performed.

2. Describe the manner in which the embryo is fertilized, nourished, and developed.

3. Give a general account of the Flowers, Leaves, Fruit, Secretions, and deleterious or useful properties of the Family to which the *Ninjimu* belongs.

4. Give a similar account of the Family to which the *Abura na* belongs.

D. B. McCartee.

Elementary Mechanics.

1. Give Duchayla's demonstration of the parallelogram of forces, as far as relates to the magnitude of the resultant.

2. If three forces are in equilibrium each force is proportional to the sine of the angle between the direction of the other two.

3. Two forces 7 and 8 act in the same plane on the same material particle. The angles which their directions form with an axis X passing through the particle are respectively 20° and 110°. Resolve the forces, and find the direction and magnitude of their resultant.

4. State and demonstrate the "Principle of Moments."

5. Describe the Elbow-joint Press, and find the ratio between the force applied and the resistance overcome.

6. A lever of uniform thickness and 15 feet long is kept horizontal by a weight of 150 lbs. applied at one extremity and a force P applied at the other so as to make an angle of 40° with the horizon, the fulcrum is 25 inches from the point of application of the weight, and the weight of the lever is 16 lbs. What is the value of P, and what is the pressure upon the fulcrum?

7. The power, resistance, and normal pressure in the case of an inclined plane, are respectively 45, 65, and 30 lbs. What is the inclination of the plane, and what angle does the power make with the plane?

8. A body was observed to fall through a height of 50 feet in the last second. How long was the body falling and through what distance did it descend?

9. Define: (a) Centre of Percussion, (b) Moment of Inertia.

P. V. VEEDER.

INORGANIC CHEMISTRY.

1. Describe the process for making coal-gas.

2. What is the difference between the bleaching action of sulphuric acid and that of chlorine?

3. Represent the reactions which occur in the preparation of phosphorus from bone-ash. How do common and allotropic phosphorus differ?

4. Give the formulas for the different phosphoric acids, and mention their characteristic reactions. Represent the action of hydrogen nitrate upon phosphorus.

5. Name the tests by which arsenic can be detected.

6. State the characteristic tests for the potassium salts.

7. How many tons of vitrol, containing 72 per cent. of sulphuric acid, will be needed to convert 111 tons of salt into salt-cake, and how many tons of the latter will be found?

8. Mention the distinguishing reactions of the compounds of calcium, barium and strontium.

9. Describe the manufacture of cast-iron from clay iron-stone.

10. Describe the Cementation and Bessemer processes for making steel.

11. What weight of "tin salts" will 175 kilos. of tin yield?

12. How is "white lead" manufactured?

13. Give the distinguishing tests for copper, mercury, gold and silver.

G. J. Rockwell.

Latin.

Write out a translation, in correct English, of Sections LXXVII & LXXVIII in the Latin Reader, ("Geography of the Nations of Antiquity,") and then give the literal meaning of each word, with the Conjugations, Declensions, Grammatical Rules, etc.

D. B. McCartee.

Political Economy.

1. What are some of the Advantages and Disadvantages of Credit?

2. What are some of the Incident Advantages and Disadvantages of a National Debt.

3. State some of the objections urged against Free Trade, on the one hand, and against Protection, on the other.

4. Explain what is meant by the terms Direct Taxation, and Indirect Taxation.

5. Explain the difference between *Specific* and *Ad Valorem Duties.*

D. B. McCartee.

SECOND CLASS (A DIVISION).

English Literature.

1. Mention the names and writings of twelve leading American writers in History, Poetry, etc.,

2. What is Channing's view of poetry? And what is his estimate of Milton? How does poetry act upon education and civilization?

3. Write a description of Governor Van Twiller in Washington Irving's style, and mention what that style is.

4. Explain the following expressions: Light reading,—conscious dignity of a prophet,—interprets by his own consciousness,—the poetic mind observes higher laws than it trangresses,—morbid,—fastidious,—flexible,—encroachment,—evanescent,—hollowness of the world,—vehicles of sublimest verities.

5. Change the forms of the following expressions: Reflective habits—make up his mind,—a lasting name, —outset of his career,—troubling his head.

6. Paraphrase two verses from Longfellow's Psalm of Life: Those commencing "Art is long and time is fleeting."

J. Summers.

Logic.

1. What is a logical proposition? Name and explain the parts of it.

2. What is meant by predicables? Name and explain.

3. What is the logical rule for definition?

4. What is *summum genus* and *infima species?*

5. Explain *syllogism, premiss, quæstio, problem.*

6. Give rules for logical *division.*

7. Explain *mood, figure, middle term.*

8. By what rules is a syllogism to be tested?

J. Summers.

Trigonometry.

1. Given the sines and cosines of two arcs, to find the sine and cosine of the sum and of the difference of the same arcs expressed by the sines and cosines of the separate arcs.

2. Given, the three sides of any plane triangle, to find some relation which they must bear to the sines and cosines of the respective angles.

3. Prove that two symmetrical spherical triangles are equal in area.

4. Prove that the cosine of any of the angles of a spherical triangle is equal to the product of the sines

of the other two angles multiplied by the cosine of the included side, minus the product of the cosines of these other two angles.

W. E. PARSON.

HISTORY OF UNITED STATES.

1. How was the American continent first peopled?
2. How did its so-called "discovery" take place?
3. Name the European countries which colonized there.
4. How did the United States become a nation?
5. Describe the "Constitution" of the United States.
6. What is meant by "the Monroe Doctrine?"
7. What are the relations of the United States and Japan?

EDW. W. SYLE.

INORGANIC CHEMISTRY.

1. What are the decompositions by which sulphuric acid is prepared in the "leaden chamber."?
2. How many tons of chamber-vitriol, containing 70 per cent. of sulphuric acid, can be prepared from 275 tons of pyrites containing 42 per cent. of sulphur?

3. Represent the action of nitric acid upon phosphorus. Give the formulas for the different phosphoric acids, and mention their characteristic reactions.

4. How can we obtain soluble and insoluble silica?

5. How is hydrogen arsenide distinguished from hydrogen antimonide?

6. State the decompositions by which salt-cake is converted into soda ash.

7. Describe the action of "hard-water" on soap.

8. Give a short description of the composition and properties of the different kinds of glass.

9. How is zinc extracted from its ores? State its properties and distinguishing reactions. Describe the manufacture of "wrought-iron." How do cast-iron, wrought-iron and steel differ in composition?

10. Mention the distinguishing reactions of the bismuth compounds.

11. How is silver extracted from argentiferous lead?

G. J. Rockwell.

Cosmical Physics—Astronomy.

1. Give a brief history of the discoveries which led to the overthrow of the Ptolemaic system and the establishment of the Copernican.

2. State Kepler's Laws.

3. Define (*a*) Azimuth, (*b*) Amplitude, (*c*) Prime Vertical, (*d*) Right Ascension, (*e*) The Zodiac.

4. Give Kirchoff's theory of the physical constitution the sun.

5. Explain the retrogade motion of an inferior planet.

6. Define: (*a*) The equation of time, (*b*) The annual parallax of the fixed stars.

7. Show how the moon's parallax is ascertained.

8. Show how the distance of the earth from the sun is determined from the transits of Venus.

P. V. Veeder.

SECOND CLASS (DIVISIONS *A* AND *B*).

Elementary Physics.

1. Mention five classes of the effects of heat upon matter, or the properties of matter.

2. What degree Centigrade, and what degree Fahrenheit, corresponds to 15° Reaumur?

3. A rod of tin is 20 c.m. in length at 0° C., and 21. 6 c.m. in length at 40° C.; what is the co-efficient of expansion?

4. State the laws of the expansion of liquids.

5. What are the different effects of pressure upon the melting point of different substances?

6. Give Fourier's definition of conductivity.

7. What is the difference between specific heat and latent heat? and in both cases what transformations of energy take place?

8. What is a kilogrammetre?

9. Give the rule for finding the proportion of heat which can be utilized when carried through a perfect heat engine.

10. What is the difference between illuminating power and intrinsic luminosity?

11. Find an expression for the relations between the two conjugate foci of a concave spherical mirror.

12. Define: *(a)* Index of Refraction, *(b)* Critical Angle, *(c)* Angle of Deviation, *(d)* Refrangibility, *(e)* Dispersion.

13. Name the properties of light which are possessed by dark heat.

14. What kind of a spectrum is given (*a*) by carbon, (*b*) by the ignited vapor of sodium, (*c*) by the sun?

15. Describe an experiment showing that bodies when cold, or comparatively cold, absorb the same rays which they give out when heated.

16. Explain Newton's Rings.

17. What is Young's explanation of the polarization of light?

18. What are the different modes of developing electrical separation?

19. What are the two laws of electrical force between two electrified bodies?

20. Define (*a*) Electric Density, (*b*) Inductive Capacity.

21. When will a diamagnetic substance appear to be magnetic?

22. Describe Thomson's experiment showing thac electrical separation may be produced by the simple contact of two different metals.

23. State Ampére's laws of the mutual action of electrical currents.

24. The electro motive force of a single cell is 2; the internal resistance is 7; the external resistanct is 500: compare the current obtained from one cell with that obtained from 100 cells in series.

P. V. Veeder.

Zoology.

1. Give the distinguishing characteristics of the Crustaceans.

2. Explain the terms Larva, Pupa, and Imago; also Chrysalis, and Cocoon.

3. How do you distinguish the snake-like Lizards from the true Serpents.

4. Give the distinguishing characteristics and divisions of the order Quadrumana, and name a Japanese example of this order.

5. Give a scientific description of the Animal now exhibited to the class.

D. B. McCartee.

SECOND CLASS.

(B DIVISION).

English Literature and Rhetoric.

1. Write an essay on *Studies*, showing their *use* and *abuse*, the kind of studies to be taken up, and the *way* they should be pursued. Give the relative values of History, Poetry, Mathematics, Physics, Logic and Rhetoric in education.

Define *wit* according to Barrow, and explain the terms : *versatile, postures, garbs, Proteus, pat allusion, apposite tale, ambiguity, affinity, sly question, tart irony, lusty hyperbole, lucky hitting off, rovings of fancy, nimble sagacity of apprehension.*

3. Paraphrase :

Bring with thee
Nods and becks and wreathed smiles,
Such as hang on Hebe's cheek,
And love to live in dimple sleek :
Sport that wrinkled Care derides,
And Laughter holding both his sides.

4. What was Milton's object in the L'Allegro. Write an abstract of it, showing his description of Melancholy, Mirth, Liberty, the dawn, sunrise, spring, summer, the haytime, the village feast, the busy world and its pleasures, the theatre, poetry and music.

5. Explain the expressions—Cynosure, chequered shade, rebus, junkets, Friar's lantern, basks, matin, saffron robe, taper, haunted stream, learned sock, Orpheus and Eurydice.

6. Describe Sir Roger de Coverly in the manner of Addison, especially in relation to his friends, his servants, his chaplain and his tenants.

7. Give an abstract of the Vision of Mirza, pointing out the metaphors and explaining the whole allegory.

8. Mention the different styles of English authors, and characterize each. What is meant by barbarisms and solecisms, purity and perspicuity of style?

J. Summers.

History of France and of Oriental Nations.

1. Name the region from which the human race appears to have spread; and give the reasons in fixing the locality.

2. Give the prominent characteristics of the following ancient peoples: 1. Babylonians, 2. Phenicians, 3. Egyptians, 4. Chinese, 5. Hindoos.

3. Enumerate the sources from which we obtain information concerning the early condition of these nations.

4. Give some account of the Gauls who occupied the country, now called France; also of the Franks and Normans.

5. Describe the character and principal achievements of Charlemagne.

6. Also, those of Louis XIV.

7. What is understood by the "States-General;" and how were they affected by the Revolution of 1789?

8. What were the principal causes which led to that Revolution?

9. What was the career of the First Napoleon?

10. Name the existing political parties in France.

EDW. W. SYLE.

GEOMETRY.

1. Any one of the three plane angles bounding a triedral angle is less than the sum of the other two.

2. The convex surface of the frustum of any right pyramid is measured by the sum of the perimeters of the two bases, multiplied by one half the slant height of the frustum.

3. If the diameter of the single base of a spherical segment be sixteen inches, and the altitude of the segment be four inches, what is its solidity?

4. If a triangle be revolved about either of its sides as an axis, the volume generated will be measured by one-third of the product of the axis and the area of a circle, having for its radius the perpendicular let fall from the vertex of the opposite angle on the axis, or on the axis produced.

W. E. Parson.

Algebra.

1. $x^4 - 3x^3 - 4x^2 + 30x - 36 = 0$.

Two roots of this equation are $+2, -3$; what is the depressed equation, with its roots?

2. $x^3 + 9x - 6 = 0$, to find one value of x by Cardan's formula for cubic equations.

3. $x^3 - x^2 - 40x + 108 = 0$; the initial figure of one positive root is 4; determine the decimal part to five places, by Horner's method.

W. E. Parson.

Inorganic Chemistry.

1. One hundred and fifty grammes of potassium nitrate are heated with sulphuric acid; how much nitric acid and hydrogen potassium will be obtained?

2. What are the tests for nitric acid?

3. How is ammonia prepared?

4. How is hydrogen fluoride prepared? What is its action upon glass?

5. Mention the allotropic modifications of carbon.

6. What volume will two litres of carbon dioxide measured at 0° C. and 760 m.m. become at a temperature of 49° C. and 760 m.m. pressure?

7. How was coal formed? Mention some of the different varieties.

8. Describe the principle of the "safety-lamp."

9. State how the different allotropic modifications of sulphur may be prepared, and mention their properties.

10. How much sulphuric acid and copper must be used to obtain $1\frac{1}{2}$ kilos. of sulphur dioxide?

11. State how selenium and tellurium may be prepared; their properties, and illustrate the analogy existing between them and sulphur.

12. Give the method of preparation, and properties of silicon. Into what classes are silicates divided?

13. How may arsenic be obtained from its compounds? Mention its properties and principal compounds.

G. J. Rockwell.

THIRD CLASS (A DIVISION).

English Literature.

1. Trace the progress of English Literature through the Stuart period and the Commonwealth.

2. Give some account of Knox, Bacon, Milton, Selden, Usher, Dryden.

3. What leading authors were alive at the accession of James I?

4. Who wrote the "*Rehearsal*," what was it intended to ridicule? and what influence had it upon dramatic literature?

5. How does Milton characterize Shakespeare and Ben Jonson in the L'Allegro?

6. What is the *Comus*, where and by whom was it written? What sentiment runs through it?

7. Mention the authors of the following work. "The Silent Woman," "The Scornful Lady," "Knight of the Burning Pestle." "Hudibras," "Leviathan," "The Gentleman Usher," "Titles of Honour," "Tenure of Kings and Magistrates."

J. Summers.

ALGEBRA.

1. How many different combinations can be formed with eight letters taken four at a time?

2. Give the formulas for L and S in an arithmetical progression.

3. The sum of four numbers in arithmetical progression is 24, and their continued product is 945; what are the numbers?

4. Expand $(a + x)^{-4}$ into a series.

5. Give Cardan's formula for cubic equations.

6. Given the equation

$x^3 - 3x^2 - 12x + 24 = 0$ to find the number and situation of the real roots by Sturm's theorem.

W. E. PARSON.

GEOMETRY.

1. Similar triangles are to one another as the squares of their homologous sides.

2. An angle formed by a tangent and a chord, is equal to an angle in the opposite segment of the circle.

3. To find the side of a regular polygon of fifteen sides, which may be inscribed in any given circle.

4. Given the radius of a circle unity, to find the areas of regular inscribed and circumscribed hexagons.

5. If we assume the diameter of the earth to be 7,956 miles, and the eye of an observer be 40 feet above the level of the sea, how far distant will an object be, that is just visible on the earth's surface?

HORACE WILSON.

PHYSICAL GEOGRAPHY.

1. What difference exists between the climates of the northern and southern hemispheres? What causes produce that difference?

2. What are the monsoons? What causes them? Explain the influence of deserts upon monsoons and rains.

3. Describe some of the offices of clouds in the physical economy.

4. How do you account for the formation of bars and deltas? What rivers are famous for deltas? Why has the Amazon no delta?

5. What are crevasses? How do you account for them? What are moraines, and how are they formed?

6. What are the chief agents in begetting currents? What are the subordinate agents?

7. What evidence do ocean currents afford as to the character of the Antartic regions?

8. What evidences are there that the moon is the cause of tides? What is meant by diurnal inequality and how do you account for it?

9. At what depth and in what kind of water is the coral polyp found? How is the formation of coral islands in deep water accounted for?

10. Describe the work that has been done by the infusoria of the sea.

11. In what part of their belt of production are plants generally the most prolific? Give examples.

12. What can you say of the importance of coal? Of the formation of coal-beds? Of the distribution of coal-beds over the earth?

13. Explain how the climate of a region may be affected by the work of man. Give examples.

14. Point out some of the physical influences of the great number and extent of the fresh-water lakes of North America.

15. Describe the rainy seasons and the rain winds of Central America, Mexico, and the north west coast generally.

HORACE WILSON.

English History.

To Accession of William III.

1. Name the successive occupants of the British Isles.

2. Who were Caradoc, Arthur, Alfred, Macbeth, Canute and William I.?

3. Give the successive Dynasties since 1066.

4. What occasioned the War of the Roses?

5. What events in the Reign of Henry VIII. are most noteworthy?

6. Name the most eminent characters in the reign of Elizabeth.

7. What was "the Commonwealth"; and how long did it last?

8. What led to the accession of William III.?

9. Describe the British Parliament.

Edwd. W. Syle.

Physics.

1. According to the "wave theory," how is light produced?

2. What is the law relating to the intensity of light? Illustrate.

3. State the action of convex and concave lenses on light.

4. Describe the single-prism spectroscope.

5. Explain why it is that the lines in the "solar-spectrum" are black.

6. Describe an experiment which proves that sound is capable of being refracted.

7. Give the theory of the operation of the "galvanic battery."

8. Give Ampère's theory of magnetism.

9. Describe Oersted's experiment.

10. State the laws of the attraction and repulsion of currents.

11. For what purpose is the "relay" used in telegraphy?

G. J. ROCKWELL.

HUMAN AND COMPARATIVE ANATOMY AND PHYSIOLOGY.

1. What Organs are essential for the production of Sound?

2. In what respect does the respiratory apparatus of Birds resemble that of Insects?

3. Give the names and functions of the Cranial Nerves.

4. Give the principal parts of the Eye, and their uses.

5, Describe the Internal Ear.

D. B. MCCARTEE.

Rhetoric.

1. What is rhythm in prose and poetry, and how is the melody of sentences often best secured?

2. What may be said of the elasticity of the English Language; how may it compare in dignity, strength, precision and smoothness with other languages?

3. Define style; what produces variety in style, and to what should it be adapted?

4. What is an essential pre-requisite to perspicuity, and how is it sometimes violated?

5. What is the opinion of Gibbon, Prescott, Webster and Carlyle on the mode of acquiring a good style?

6. State the four objects of Writers and Speakers.

7. What is invention in Rhetoric, and what general rules should be employed as a guide in it?

8. Give the rules which embrace the most valuable general principles of Elocution.

H. N. Allin.

THIRD CLASS.—B. DIVISION.

English Language.

1. Correct the spelling of the following words and give their meanings.

Proverbal -- litrally — mordlin—abtrusive—purraded—affruntry — curosty— fisick—littariture—prodigeus—weery—sollitry — ile—vorlt—boste—ekstisy—lire —scareen—pennury—trofees.

2. Compose a few lines containing the following words and expressions.

Curfew—sun is setting—cattle—across the fields are—tired ploughman is—home—scene—glimmers—eye—air—full of—except beetle—flight—sheeps' bells —tinkle—owl is—in yonder—complaining to—of some one—near her perch—interferes—reign.

J. Summers.

Algebra.

1. Find the values of the forms $\frac{a}{o}, \frac{a}{\infty}, \frac{o}{a}, \frac{o}{o}$.

2. What properties of roots depend upon the law of signs in involution ?

3. Divide 15 $c^3 (a-b)^{\frac{3}{2}}$ *by* 3 $c^2 (a-b)^{\frac{1}{2}}$.

4. Prove that $\frac{a^m}{a^n} = a^{m-n}$, when m and n are fractional.

5. Deduce a rule for extracting the square root of a binomial surd in the form of $a \pm \sqrt{b}$.

What is the square root $7 + 30 \sqrt{-2}$?

6. $25 x^2 + 6 + \frac{4}{9 x^2} = \frac{935}{9}$. Find x.

7. Given $x^2 + x y = 56$ and $xy + 2y^2 = 60$, to find x and y.

8. Give $x + y = 8$ and $x^4 + y^4 = 2402$, to find x and y.

9. Write the four forms necessary to represent all the varieties of the general equation $x^2 + 2 ax = b$, and find the roots of these equations. Now determine what conditions will render these roots real or imaginary, positive or negative, equal or unequal.

10. The sum of two numbers is to their difference, as 4 to 1, and the sum of their squares is to the greater as 102 to 5. What are the numbers?

HORACE WILSON.

ENGLISH HISTORY.

1. Describe the original inhabitants of England, Ireland and Scotland.

2. At what time did the Romans abandon Britian, and what was the effect of Roman civilization on the Britians?

3. At what time did the Saxons settle in England?

4. Give some account of the reign of Egbert and Alfred.

5. Give an account of the battle of Hastings and the results.

6. What were the game laws, and what was meant by the new forest?

7. Give a detailed account of the "War of the Roses," and who was proclaimed King after the death of the Duke of York?

8. What led to a change in the relation between Henry the 8th and the Pope, and how did the latter seek to avoid a quarrel with him?

9. Relate the particulars of the gunpowder plot.

H. N. Allin.

Rhetoric.

1. What is the derivation of the word Rhetoric, and what did the ancients regard as essential to the mastery of this art?

2. State what advantages result from the study of Rhetoric and what is its province as a science.

3. What is the common acceptation of the term Genius; how does it differ from Taste; which is the higher power and as possessed by individual minds which extends to the wider range of objects?

4. How does the emotion produced by novelty compare with that excited by beauty?

5. Show that novelty is possessed by objects in different degrees.

6. Enumerate the most fruitful sources of moral sublimity; exemplify each.

7. What are the advantages which accrue from the use of figurative language.

8. What is style and from what derived?

9. Enumerate the principal varieties of style and define the seven essential properties of style.

H. N. Allin.

Human Anatomy and Physiology.

1. Name and describe the Glands concerned in Mastication and Digestion.

2. Describe the Capillaries and their uses.

3. Give a general account of the Skin and its constituent tissues.

4. How many kinds of Nervous matter are found in the Brain; and how are they distributed?

5. Describe the Membranes, Humors, etc., of the eye.

D. B. McCartee.

THIRD CLASS (C. DIVISION).

English Language.

1. Give a sketch of Mr. Boswell after Macaulay.

2. Correct the spelling of and explain the following words—survyl—emperteenint—tarverns—intleckt—clammurus—maudling—weemies—mavlusly.

3. Explain and give the context in Gray's elegy of the following: plods—stubborn—clarion—envied—heraldry—long-drawn—lyre—tyrant—penury—inglorious—fretted.

J. Summers.

General History.

1. What inhabitants are represented by the two great races (the Aryan and the Semitic), and among the descendence of which may we class such men as Descartes, Dante, Michael Angelo, Charlemagne and Shakespeare ?

2. What specimen of Semitic literature have we, and what facts only does it embody; together with an account of the Hebrew Kings.

3. *What gave rise to the Peloponnesian War, and what effect had these reverses on the progress of art and literature at Athens ?

4. What was the first code of written laws in Rome, and at the demand of which party were these drawn up ?

5. Into what three periods may we divide the Middle Age ? State the divisions of society, and the beneficial results arising from the Crusades ?

6. What principal dynasties have controlled the German empire since the overthrow of Rome ?

7. What was the cause and general result of the thirty years war in Germany ?

8. State the particulars of the Franco-Prussian War.

H. N. Allin.

EXAMENS DE FIN D'ANNÉE

(1875-1876.)

SECTION FRANCAISE.

1ère DIVISION.

Algébre.

Décomposer le polynôme à 5 variables

$$(\mathrm{I})\quad x^2+y^2+z^2+u^2+v^2+(x+y+z+u+v)^2,$$

composé de 6 carrés, en une somme de 5 carrés de fonctions homogènes du 1er degré.

Chercher s'il y a une loi dans la succession de ces fonctions, et en déduire, par généralisation, la décomposition d'un polynôme à n variables, de la forme (I), en une somme de n carrés de fonctions homogènes du du 1er degré.

Mangeot.

Géométrie Descriptive.

1. Construire l'intersection d'une sphère et d'un cylindre de révolution.

Données—Le cylindre est tangent au plan horizontal et ses génératrices sont perpendiculaires au plan vertical. La sphère a son centre sur la génératrice de contact et a pour rayon le diamètre du cylindre.

On ne représentera que la moitié de la sphère située au dessus du plan horizontal.

Mangeot.

Géométrie Analytique Plane.

Etant données deux hyperboles homofocales, on inscrit dans l'une d'elles des cordes tangentes à l'autre. Trouver le lieu des milieux de toutes ces cordes.

Mangeot.

Géométrie Analytique dans L'espace.

1. Trouver la surface engendrée par une droite s'appuyant sur un cercle donné et sur deux droites fixes qui rencontrent le cercle aux extrémités d'un même diamètre.

2. Trouver le lieu des projections du centre d'un ellipsoïde sur tous ses plans tangents.

Mangeot.

PHYSIQUE.

1. Prouver, par la reflexion totale, l'inégale réfrangibilité des rayons du soleil.

2. Expliquer la présence des raies obscures dans le spectre solaire.

MECANIQUE.

1. Démontrer le principe fondamental des engrenages.

2. De l'engrenage à flancs et de l'engrenage à développante de cercle dans le cas d'un seule rone et de plusieurs pignons.

ALGÈBRE.

(1). Décomposer le polynôme.

(1). $(x^2+y^2+z^2+u^2+v^2)\ (x^2+y^2+z^2+u^2+v)^2$,

à cinq variables n, y, z.—, en une somme de cinq carrés et en déduire la loi de formation des fonctions linéaires qui entrent dans cette décomposition.

2. Ecrire, par généralisation, la decomposition d'un polynôme à n variables de la forme (1) en une somme de n carrés du fonctions linéaires et homogènes.

GÉOMÉTRIE ANALYTIQUE À 2 DIMEN.

Etant données 2 hyperboles homofocales trouver et construire le lieu des milieux des cordes de l'une des hyperboles, tangente à l'autre.

GÉOMÉTRIE ANALYTIQUE À 3 DIMEN.

1. Trouver le lieu engendré par une droite qui s'appuie à la fois sur un cercle donné et sur 2 droites qui

passent par les extrémités d'un même diamétre du cercle.

2. Trouver le lieu des projections du centre d'un ellipsoide sur tous ses plans tangents.

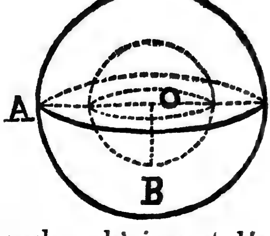
Géométrie descriptive.

Trouver l'intersection d'un cylindre de révolution dont l'axe est perpendiculaire au plan vertical et reposant sur le plan horizontal, et d'une sphère dont le rayon est égal au diamétre du cylindre et ayant son centre sur la génératrice de contact.

KLOTZ.

2e DIVISION.

Géométrie.



1. Le côte d'un carré est de 10 mètres et celui d'un pentagone régulier est de 8 mètres. Quel est de ces deux polygones celui dont la surface est la plus grande ?

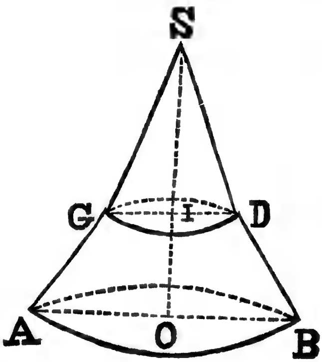
2. Trouver la valeur d'une couche sphèrique et démontrer qu'elle est équivalente au volume d'un tronc de cone dont les rayons des

bases sont les mémes que ceux des deux sphères et dont la hauteur est le quadruple de l'epaisseur de la couche sphèrique.

3. Mener un plan tangent à trois sphères données.

P. Fouque.

Algèbre.



1. Un cône a pour base, la base supérieure d'un tronc de cône, les surfaces convexes de ces deux corps sont égales et les aires de leurs sections méridiennes sont aussi équivalentes. Le volume de ces solides réunis est équivalent à qui aurait pour rayon la hauteur du tronc de cône. Cette dernière hauteur étant supposée égale à $1^m, 50$, on propose de calculer à 1 centimètre près, les rayons des bases et la hauteur du cône superposé.

2. Développer en série $F(x) = L.(1 + x)$ et arriver à la formule qui sert à calculer les logarithmes Népéricus. Indiquer une limite de l'erreur en s'arrétant à un certain terme.

P. Fouque.

Géométrie Descriptive.

1. Trouver l'angle formé par deux droites quelconques de l'espace. (Méthode des Rotations.)

2. Déterminer la section d'un cône droit par un plan quelconque, mener la tangente en un point de cette section et construire le développement de la courbe intersection. (Méthode des changements de Plans.

P. Fouque.

Géométrie Analytique.

Trouver l'équation de la Lemniscate sachant que cette courbe est le lieu géométrique des points tels uue le produit des distances de chacun d'eux à deux points fixes, nommés foyers, est égal auc arré de la moiitié de la distance focale. Construirela courbe.

P. Fouque.

Physique.

1. Lunette terrestre.

2. Bobine de Ruhmkorff. Le son produit par l'aiguille étant supposé six, calculer le nombre d'interruptions et de retablissements de courant en une seconde.

P. Fouque.

Mécanique.

1. Théorème de Chasles.
2. Joint universel.

Klotz.

2e et 3e DIVISION.

Composition Littéraire.

Narration.

Cyrus délivré de la mort et son enfance.

Argument.

Astyage roi de Médie a une fille unique qu'il donne en mariage à un Perse.—Peu de temps après il a un songe dont l'interprétation jette la terreur dans son âme.—Dominé par la jalousée il fait revenir sa fille, il surveille avec anxiété le moment de sa délivrance. L'Enfant né, il le remet à un de ses officiers avec ordre de le faire périr.

Dix ans après, cet enfant, qui avait été sauvé par une esclave du Roi, conduit devant Astyage, pour subir un châtiment, dévoila en même temps son existence, son caractère et son origine.

Cyrus grandit, et avec ses années grandirent aussi ses souvenirs, ses idées et son ambition.—Il devint le vainqueur de son aïeul. Le conquérant de l'Asie, en un mot, le puissant roi de Perse.

Narration.

L. DURY.

COMPOSITION.

Sur les Figures et les Formes du Style.

1. Parmi les moyens modificateurs de l'expression de la pensée, quels sont ceux qui sont le plus employés par les Poètes, les Orateurs et les Ecrivains? Et sous quel nom ont-ils été classés par les Rhétheurs?

2. Qu'apelle-t-on Figures?

3. Quel est le but et l'object propre des Figures?

4. Quelles sont les cinq règles générales, relatives au style figuré, que doivent observer les Ecrivains et les Oraturs?

5. Comment les Rhéteurs appelent-ils les divers mouvements de style qui tiennent

1°. Au sentiment et á la Pensée?

2°. Aux mots seulement?

6. Combien distingue-t-on ne Figures de Pensée?—quelles sont les principales?

7. Qu'est-ceque l'Antithése?—quelle est la qualité éssentielle de cette figure?

8. Qu'est-ceque l'Ironie?—quelle est la condition qu'exige l'emploi de cette figure?

9. Qu'est-cequ'une figure de mots, et combien en distingue-t-on?—quelles sont les principales?

10. A quoi surtout doit être subordonné l'emploi de ces figures?

11. Qu'est-ceque la Métaphore?

12. Quelles sont les trois qualités de la Métaphore?

L. Dury.

TROISIÈME DIVISION.

Composition d'Histoire

Faites un résumé très succinct.

1. De l'Histoire Ancienne.—Des anciens peuples de l'orient; les hommes des temps primitifs; la dispersion des peuples; les grandes races humaines; premiers commencements de la civilisation; cités lacustres ou Palafites. Les Egytiens; les Phéniciens; les Juifs; les Assyriens et les Babyloniens; les Médes et les Perses, les Grecs et les Romains; le Christianisme.

2. De l'Histoire du Moyen-âge. L'invasion des Barbares; la chûte de l'Empire d'occident; origine et progrès de l'Islamisme; grandeur de Charlesmagne; invasion des Normands; importance des croisades et

leurs résultats pour la civilisation Européenne. Découvertes et inventions: le ver-a-soie; la poudre a canon; la Boussole; l'Imprimerie.

3. De l'Histoire Moderne.—La fin de la guerre de cent ans; chûte l'Empire d'Orient; les Turcs prennent Constantinople; Christophe Colomb découvre le nouveau monde; la réforme par Luther; décadence de la maison d'Autriche; Louis XIV et son siècle; les Philosophes et les Réformateurs.

4. De l'Histoire Contemporaine.—La révolution Française; le Consulat et l'Empire: la restauration et les traités de 1815; le Deuxième Empire; la guerre de Crimée; unification de l'Italie; révolution d'Espagne; guerres de la Prusse avec l'Autriche; de l'Allemagne avec la France; insurrections en Turquie; abdication du Sultan.

L. Dury.

ARITHMETIQUE.

1. La longitude de Paris étant 0°, celle de Tokio est de 137° 35′. Ces deux longitudes sont Orientales, on demande quelle heure il est à Tokio, lorsqu'il est 1 heure de l'après-midi à Paris?

2. En France, l'Etat perçoit $\frac{1}{10}$ duprix des places sur les chemins de fer, au lieu du $\frac{1}{20}$ qu'il percerait autrefois; cette augmentation rapporte 16 miliions

de francs à l'Etat. Quelle est la recette magenne des chemins de fer, pour le transport des voyageurs?

3. Le mille marin correspond à l'arc de 1 minute sur un grand cercle terrestre, la lieue marine vaut 3 milles, calculer combien il y a de lieues au degré et combien ces lieues valent de mètres.

P. Fouque.

Geometrie.

1. Démontrer que dans tout triangle rectangle.
   1*o*. Le diamètre du cercle circonscrit est égal à l'hypoténuse.
   2*o*. Le diamètre du cercle inscrit est égal à l'excés de la somme des deux côtés de l'angle droit sur l'hypoténuse.

2. Le rayon de la surtace des mers supposée sphérique est égal à 6,366,198 mètres. A quelle distance peut s'étendre en pleine mer la vue d'un observateur placé au sommet d'une tour à 50 mètres au dessus du niveau de l'eau?

3. Diviser un cylindre en deux parties équivalentes par en cylindre concentrique, c'est-à-dire ayant la même hauteur et le même axe.

P. Fouque.

Géométrie Descriptive.

1. Trouver l'intersection de deux plans quelconques, en supposant que la feuille de l'épure n'est pas assez grande pour avoir l'intersection des traces de ces deux plans.

2. Par un point donné, mener une droite s'appuyant sur deux autres droites données.

P. Fouque.

Trigonométrie.

1. Démontrer que la somme des sinus de deux arcs est à leur différence, comme la tangente de la demi-somme est à la tangente de la demi-différence.

2. Vérifier la relation :

$$Tg.\ a \pm Tg.\ b = \frac{sin\ (a \pm b)}{Cos\ a.\ Cos\ b.}$$

3. Rendre calculable par logarithmes l'expression : $y = Sec.\ a \pm Sec.\ b.$

P. Fouque.

Composition en Algèbre.

1. Calculer les deux côtés d'un triangle rectangle dont on connait l'hypoténuse (a) et le périmètre (2 p). Discuter les valeurs trouvées.

2. Transformer l'expression :

$$\sqrt{b\,c + 2\,b\,\sqrt{b\,c\text{-}b^2}} \times \sqrt{b\,c\text{-}2\,b\sqrt{b\,c\text{-}b^2}}$$

à une autre n'ayant pas de radicaux superposés.

Composition en Physique.

1. Loi d'Ohm.

2. Précautions à prendre dans le choix dun galvanomètre.

3. Loi de Lintz. L'expliquer sur un exemple.

Klotz.

REGISTER OF STUDENTS.

1876.

N.B.—The classes are arranged in the order of their relative grades at the July examination.

STUDENTS SENT ABROAD.

To America.

Miura-Kadsuo	...Tokio.
Komura-Jutaro	...Miyasaki.
Saito-Shiuichiro	...Tsuruga.
Kikuchi-Takeo	...Iwate.
Matsui-Naokichi	...Gifu.
Hasegawa-Yoshinosuke	...Mitsuma.
Nanbu-Kiugo	...Tsuruga.
Hirai-Seijiro	...Ishikawa.
Haraguchi-Kaname	...Nagasaki.

To England.

Iriye-Nobushige	...Yehime.
Okamura-Teruhiko	...Tokio.
Sagisaka-Naoshi	...Tochigi.
Sakurai-Joji...	...Ishikawa.
Sugiura-Shigetake	...Shiga.

Sekiya-Kiyokage... ... ...Gifu.
Masuda-Raisaku ... ...Oita.
Taniguchi-Naosada ... ...Sakai.

TO FRANCE.

Furuichi-Koi ... ...Shikama.
Yamaguchi-Hanroku ... ...Shimane.
Okino-Tadao ... ...Toyooka.

TO GERMANY.

Ando-Kiyoto ... ...Kumamoto.

SPECIAL COURSES.

MIDDLE LAW CLASS.

Nomura-Chinkichi ... ...Kumagaya.

JUNIOR LAW CLASS.

Fujita-Takasaburo ... ...Yehime.
Nishikawa-Tetsujiro ... ...Aomori.
Takahashi-Kenzo... ... ...Chiba.
Kawakami-Kinichi ... ...Yamaguchi.
Hatakeyama-Shigeaki... ... ...Tokio.
Yamaoka-Yoshigoro ... ...Hiroshima.
Kume-Sukekichi... ... ...Gifu.
Motoyama-Masahisa ... ...Tokio.
Oki-Fusahide ... ...Tokio.
Matsumura-Jinzo ... ...Ibaraki.
Yezawa-Ichiro† ... ...Tokio.

† Deceased.

MIDDLE CHEMISTRY CLASS.

Takasu-Rokuro ... ...Tokio.
Kuhara-Mitsuru ... ...Okayama.
Miyasaki-Michimasa ... ...Tsuruga.

JUNIOR CHEMISTRY CLASS.

Iwaya-Riutaro ... ...Shiga.
Oshima-Michitaro ... ...Iwate.
Ishimatsu-Sadamu ... ...Fukuoka.
Ito-Shinrokuro ... ...Ibaraki.
Isono-Tokusaburo .. ..Mitsuma.
Takayama-Jintaro ... ...Ishikawa.
Watanabe-Jinichiro ... ...Saitama.
Takamatsu-Toyokichi... ... ...Tokio.
Watanabe-Wataru ... ...Tokio.
Kobayashi-Keinosuke... ... ...Tokio.
Fukuda-Riosaku ... ...Tokio.
Takeo-Masanobu... ... ...Tokio.
Suzuki-Shunsaburo* ... ...Ishikawa.
Taneda-Orizo* ... ...Kaitakushi.
Kobayashi-Kannojo* ... ...Tokio.

* Absent from examination.

JUNIOR ENGINEERING CLASS,

Kitamura-Shigetaka ... ...Kôchi.
Ishiguro-Isoji ... ...Ishikawa.
Sengoku-Kô ... ...Kôchi.
Nakakuki-Nobuyori ... ...Tokio.
Okada-Ichizo ... ...Ishikawa.
Mita-Zentaro ... ...Tochigi.

GENERAL COURSE.

First General Class.

Kawakami-Shintaro ... ...Tokio.
Tomitani-Kôfu ... ...Tokio.
Wada-Masachika ... ...Shizuoka.
Kawamura-Isami ... ...Shizuoka.
Ohara-Kenzaburo ... ...Tokio.
Hiraiwa-Tsuneyasu ... ...Tokio.
Koto-Bunjiro ... ...Shimane.
Suzufuji-Yasuroku ... ...Kumagaya.
Masujima-Rokuichiro ... ...Shiga.
Matsuzaki-Naoshi ... ...Mitsuma.
Futami-Kiozaburo ... ...Chiba.
Isono-Hakaru ... ...Okayama.
Oyagi-Masaichiro ... ...Tokio.
Miyake-Hisanori ... ...Ishikawa.
Kitamura-Yataro... ... ...Tokio.
Chikami-Kiyomi ... ...Kôchi.
Nishi-Matsujiro ... ...Nagasaki.
Omai-Hirotada ... ...Tokio.
Kawara-Katsuji ... ... Aomori.

Fukushima-Suminaga* ... ...Chiba.
Nakakuki-Nobutomo*... ... ...Tokio.
Katsura-Seitaro* ... ...Tokio.
Tadera-Shioichi† ... ...Shizuoka.

* Absent from examination.

† Deceased.

SECOND GENERAL CLASS *A*.

Yamazaki-Tamenori ... ...Iwate.
Tachibana-Kanô ... ...Ishikawa.
Suyenobu-Sayoji ... ...Kôchi.
Takahashi-Kadsumasa ... ...Kumagaya.
Murayama-Bunzaburo... ... ...Ishikawa.
Mumedani-Junji ... ...Shikama.
Ishido-Toyota ... ...Hiroshima.
Omori-Shunji ... ...Yamanashi.
Ota-Kenjiro ... ...Shizuoka.
Uno-Tadahiro ... ...Shizuoka.
Yamashita-Yutaro ... ...Kôchi.
Kusakabe-Benjiro ... ...Shiga.
Nakakuma-Keizo... ... ...Mitsuma.
Nakazawa-Iwata ... ...Tsuruga.
Sugioka-Masahisa ... ...Ishikawa.
Akiyama-Genzo ... ...Chiba.
Uchida-Sansei ... ...Chiba.
Nojiri-Busuke ... ...Tokio.
Watanabe-Yeijiro ... ...Nagasaki.
Sakata-Sadakazu... ... ...Tokio.
Sakasaki-Naomichi ... ...Kôchi.
Kawano-Shachio ... ...Kumamoto.
Yamanaka-Hiida ... ...Kumagaya.
Usui-Wataru ... ...Tokio.
Hida-Mitsuzo ... ...Shizuoka.
Hasuike-Koretaka ... ...Tokio.
Iriye-Takanosuke ... ...Ishikawa.
Fukuda-Togo .. ..Tokio.
Fujikawa-Jiro ... ...Tokio.

Yamamoto-Kenzo* ... ...Niigata.
Natsume-Daiichi* ... ...Tokio.

* Absent from examination.

SECOND GENERAL CLASS *B.*

Yoshida-Tomokichi ... ...Ishikawa.
Kasahara-Itaru ... ...Tsuruga.
Yoshida-Hikorokuro ... ...Hiroshima.
Miyazaki-Michisaburo ... ...Miye.
Uyeno-Terumichi ... ...Ishikawa.
Imai-Seizo ... ...Shizuoka.
Moriya-Monoshiro ... ...Okayama.
Ishida-Ninao ... ...Tsuruga.
Matsura-Sayohiko ... ...Kôchi.
Matsumoto-Osamu ... ...Okayama.
Oka-Tanenobu ... ...Tokio.
Ono-Kinzaburo ... ...Shikama.
Yanagi-Sozo ... ...Miodo.
Fukutomi-Takasuye ... ...Kôchi.
Aoki-Motogoro ... ...Tochigi.
Tanokami-Seizo ... ...Okayama.
Saburi-Takashi ... ...Okayama.
Yamashita-Denkichi ... ...Kumagaya.
Koshiba-Yasuto ... ...Chiba.
Sasaki-Chiujiro ... ...Tsuruga.
Kida-Torao ... ...Shiga.
Kido-Tanehisa ... ...Tokio.
Tsubota-Hidekiyo ... ...Tokio.
Fukushima-Renpei ... ...Tsuruga.
Saigo-Hisamichi ... ...Tokio.

Nakamura-Hisatsune ... ...Kôchi.
Udagawa-Samuro ... ...Tokio.

Shimada-Yoshinobu* ... ...Tokio.
Terachi-Sakichi*... ... ...Hiroshima.

* Absent from examination.

Third General Class *A*.

Koga-Nobumasa ... ...Shizuoka.
Kurata-Yoshitsugu ... ...Nagasaki.
Kôdera-Shinsaku ... ...Shikama.
Ishikawa-Iwao ... ...Shikama.
Funakoshi-Tetsujiro ... ...Fukuoka.
Motoda-Hajime ... ...Oita.
Watanabe-Tomosaburo ... ...Sakai.
Kochibe-Tadatsugu ... ...Nagasaki.
Koba-Sadanaga ... ...Kagoshima.
Wadagaki-Kenzo... ... ...Toyooka.
Makino-Koretoshi ... ...Kagoshima.
Okubo-Toshikazu ... ...Kagoshima.
Tango-Naohei ... ...Niigata.
Kase-Chojiro ... ...Tokio.
Okakura-Kakuzo... ... ...Tsuruga.
Awoyama-Hajime ... ...Tsuruga.
Hashiguchi-Naoyemon ... ...Kagoshima.
Mizuo-Kosaburo ... ...Mitsuma.
Sugenoya-Masaki ... ...Kumagaya.

Adachi-Shintaro ... ...Chiba.
Tsuchida-Tetsuo ... ...Ishikawa.
Hattori-Fukumatsu ... ...Tokio.
Yoshikawa-Shunkichi... ... ...Tokio.
Tamura-Tomosuke ... ...Mitsuma.
Sakamoto-Kiyofusa ... ...Tokio.
Kugo-Motonaga ... ...Tokio.

Kuroiwa-Yomonoshin* ... ...Kôchi.
Masaki-Kenkichi* ... ...Mitsuma.

* Absent from examination.

THIRD GENERAL CLASS *B.*

Shiraishi-Naoji ... ...Kôchi.
Nomura-Riutaro ... ...Gifu.
Tsuboi-Kumazo ... ...Tokio.
Tsuzuki-Keiroku... ... ...Tokio.
Fujitani-Takao ... ...Tokio.
Akiyama-Seigi ... ...Tokio.
Kato-Takaaki ... ...Aichi.
Kano-Shinnosuke ... ...Hiogo.
Iijima-Kai ... ...Tokio.
Kurubara-Hikotaro ... ...Yamaguchi.
Koori-Riosaku ... ...Osaka.
Matsuda-Kojiro ... ...Tokio.
Tanaka-Ineki ... ...Yamaguchi.
Hisata-Kotaro ... ... Ishikawa.
Iwakawa-Tomotaro ... ...Aomori.
Mayeda-Motoyoshi ... ...Kôchi.

Suyeoka-Seiichi*... ....Yamaguchi.
Amano-Tameyuki* ... ...Nagasaki.
Yoshimura-Masayuki* ... ...Ishikawa.
Absent from examination.

THIRD GENERAL CLASS *C.*

Hara-Riota ... ...Fukushima.
Honda-Magoshiro ... ...Nagasaki.
Aikawa-Taro ... ...Gifu.
Hotta-Rentaro ... ...Nagano.
Sakaguchi-Sakichi ... ...Niigata.
Nakagawa-Hisatomo ... ...Tokio.
Matsuno-Teiichiro ... ...Aomori.
Takahashi-Gentaro ... ...Sakai.
Fukui-Hikojiro ... ...Osaka.
Kato-Tsuneshichiro ... ... Chiba.
Kajima-Unokichi ... ...Tokio.
Kano-Kamematsu . ...Tokio.
Oyagi-Kioda ... ...Kôchi.
Shimomura-Sanichi ... ... Toyooka.
Sudzuki-Mitsuyoshi ... ... Miye.
Seki-Shinichiro ... ...Tokio.
Takahashi-Shigeru ... .Kumamoto.
Sakai-Katsuhiro .. .. Kôchi.

Kumakura-Kiozo* ... ...Niigata.
Okada-Kenzo* ... ...Tokio.
Tachibana-Kaijiro* ... ...Kagawa.
Kato-Jungo* ... ...Ishikawa.
*** Absent from examination.**

Junior Class of Physics (French).

Terao-Hisashi ... ...Fukuoka.
Sakurai-Fusaki ... ...Ishikawa.
Senbon-Yoshitaka ... ...Tokio.
Nakamura-Kiohei ... ...Aichi.
Nobutani-Teiji. ... ...Tokio.
Ogata-Juzaburo ... ...Tokio.

First Preparatory Class.

Yatabe-Mumekichi ... ...Akita.
Toyota-Shinye ... ... Hiroshima.
Kagawa-Yoshikazu ... ...Hiroshima.
Nakamura-Kiyoo... ... ...Yamaguchi.
Wada-Yuji ... ...Fukushima.
Sameshima-Susumu ... ...Niigata.
Kase-Daisuke ... ...Tokio.
Inouye-Ikutaro ... ...Ishikawa.
Takanose-Munenori ... ...Shiga.
Nonoyama-Masayoshi ... ...Tokio.
Nomoto-Hikoichi... ... ...Hiroshima.
Hayashi-Tadamasa ... ...Ishikawa.
Ikeda-Yasushi ... ...Toyooka.
Kobayashi-Unari* ... ...Sakai.
Midzunoya-Shinobu* ... ...Tokio.

* Absent from examination.

Second Preparatory Class.

Namba-Masashi ... ...Okayama.
Uyeda-Bunzo ... ...Chikuma.
Kiriyama-Tokusaburo... ... ...Nagasaki.

Akagi-Chikayuki	...Okayama.
Miwa-Kanichiro	...Tokio.
Mimori-Mamori	.. Miodo.
Yasuda-Toto	...Oita.
Mohara-Takashi	...Iwamaye.
Shioda-Jinmatsu	...Hiroshima.
Okada-Hideo	...Ishikawa.
Hasegawa-Masamichi	...Hamamatsu.
Nakamura-Susumu	...Ishikawa.
Watanabe-Tomoichiro	...Shizuoka.
Shida-Masami	...Osaka.

TECHNICAL DEPARTMENT.

School of Arts and Manufactures.

First Preparatory Class of Chemical Arts.

Tanabe-Motosaburo ... ...Niigata.
Yajima-Daisuke ... ...Tokio.
Tamura-Tsuneakira ... ...Tochigi.
Kawachi-Michitaka ... ...Chikuma.
Shinagawa-Morio ... .Shikama.
Sugawara-Yasuki ... ...Niigata.
Kitami-Hisamichi ... ...Aichi.
Takatsu-Kinichi ... ...Yamaguchi.
Kawara-Tadashi ... ...Nagano.
Shikada-Samuro ... ...Ishikawa.
Kitami-Koichiro ... ...Yamanashi.
Saigo-Masayoshi ... ...Chikuma.
Terachi-Yasugoro ... ...Hiroshima.
Ban-Morishige ... ...Kioto.
Nonaka-Ichiro ... ...Nagano.
Yoshitake-Manpei ... ...Chikuma.
Shiomi-Tadashi ... ...Tsuruga.
Yamaguchi-Tomonosuke ... ...Toyooka.

Miyagi-Kenzo	...Sakai.
Yoshitsu-Yoshiyuki	...Kumamoto.
OgawatAtsumi	...Kôchi.
Sato-Naoshi	...Aichi.
Kono-Michitomo	...Kioto.

Second Preparatory Class of Chemical Arts.

Takeda-Yasunosuke	...Hiroshima.
Hidaka-Naritaka	...Yamaguchi.
Matsuoka-Rokuro	...Mitsuma.
Inouye-Kenzo	...Hiroshima.
Inaba-Shichiho	...Yehime.
Imamura-Takeshiro	...Chikuma.
Takagi-Seizo	...Kioto.
Takahashi-Genkichi	...Tokio.
Tozawa-Koreyoshi	...Aomori.
Kobayashi-Takima	.. Nagano.
Kamiyama-Masashi	...Tokio.
Nagashima-Kageyoshi	...Tokio.
Narita-Kinkitsu	.. Wakayama.
Matsuno-Michio	...Tokio.
Fujita-Minori	...Yamaguchi.
Takezawa-Sakujiro	.. Chiba.
Fujimiya-Kihei	...Niigata.
Hara-Bunzo	...Shizuoka.
Kobayashi-Kenzo	...Hiroshima.
Ohashi-Taiun	...Saitama.
Takahara-Heitaro	...Miodo.
Tamura-Masaakira	...Kochi.
Akagi-Masatatsu	...Tokio,

Shimomura-Hirone	...Chikuma.
Kono-Michihisa	...Mitsuma.
Momota-Shiuji	...Toyooka.
Nakahara-Sajima	...Yamaguchi.
Takehisa-Masayoshi	...Tsuruga.
Matsuzaki-Yoshimi	...Iwamai.

Second Preparatory Class of Mechanical Arts.

Nose-Migaku	...Niigata.
Azuma-Kenzaburo	...Oitami.
Suzuki-Morizo	...Mitsuma.
Nagata-Naotaka	...Tokio.
Uno-Kaname	...Shikama.
Miwake-Masao	...Miodo.
Mase-Masanobu	...Aichi.
Takao-Takeshi	...Okayama.
Matsuyama-Mankichi	...Aichi.
Yamashita-Mitsuatsu	...Sakai.
Matsui-Naotaro	...Sakai.
Fujita-Shigejiro	...Sakai.
Amagasa-Tadamichi	...Tokio.
Takeo-Kamekichi	...Tokio.
Matsuno-Masayoshi	...Niigata.
Yoshida-Moriye	...Niigata.

GENERAL SUMMARY.

Students sent abroad	21
Middle Law Class	1
Middle Chemistry Class	3
Junior Law Class	11
Junior Chemistry	15
Junior Engineering Class	6
First General Class	23
Second General Class *A.*	31
Second General Class *B.*	29
Third General Class *A.*	28
Third General Class *B.*	19
Third General Class *C.*	22
Junior Class of Physics	6
First Preparatory Class of Physics	15
Second Preparatory Class of Physics	14
First Preparatory Class of Chemical Arts	23
Second Preparatory Class of Chemical Arts	29
Second Preparatory Class of Mechanical Arts... ...	16
Total	312

Tokio	68	Kumagaya	6
Yehime	3	Tsuruga	12
Tochigi	4	Okayama	9
Shiga	6	Miyazaki	1
Oita	3	Iwate...	3
Sakai	8	Gifu	5
Shikama	7	Mitsuma	10
Shimane	2	Ishikawa	23
Toyooka	6	Nagasaki	8
Kumamoto	4	Aomori	5
Yamanashi	2	Yamaguchi	9
Hamamatsu	1	Chiba....	9
Kioto	3	Hiroshima	12
Miye	2	Ibaraki	2
Miodo	4	Saitama	2
Kagoshima	4	Fukuoka	3
Aichi	6	Kôchi...	16
Hiogo	1	Shizuoka	9
Osaka	3	Niigata	11
Fukushima	2	Kagawa	1
Akita	1	Chikuma	6
Nagano	4	Iwami	2
Oitami	1	Wakayama	1
Kaitakushi	1		

筑摩	六人	岐阜	五人
青森	五人	名東	四人
鹿兒島	四人	栃木	四人
長野	四人	熊本	四人
愛媛	三人	京都	三人
大分	三人	大坂	二人
岩手	三人	福岡	二人
山梨	二人	三重	二人
福島	二人	島根	二人
茨城	二人	埼玉	二人
磐前	二人	濱松	一人
兵庫	一人	秋田	一人
置賜	一人	開拓使	一人

同第二級生　二十九人

工作豫科第二級生　十六人

總計三百十二人

東京	六十八人	石川	二十三人
高知	十六人	廣島	十二人
敦賀	十二人	新潟	十一人
三潴	十人	靜岡	九人
山口	九人	千葉	九人
岡山	九人	長崎	八人
堺	八人	飾磨	七人
滋賀	六人	愛知	六人
豐岡	六人	熊ヶ谷	六人

法學下級生　十一人
化學下級生　十五人
工學下級生　六人
普通科第一級生　二十三人
同第二級甲生　三十一人
同乙生　二十九人
同第三級甲生　二十八人
同乙生　十九人
同丙生　二十二人
物理學下級生　六人
同豫科上級生　十五人
同下級生　十四人
製煉豫科第一級生　二十三人

高尾武資　岡山
松山鋪吉　愛知
山下光敦　堺
松井尚太郎　同
藤田平次郎　同
天管忠道　東京
竹尾龜吉　同
松野正芳　新潟
吉田守衞　同

海外留學生　二十一人
法學中級生　一人
化學中級生　三人

河野通久　三潴
百田脩治　豐岡
中原左治馬　山口
武久昌穀　敦賀
松崎由巳　磐前

工作豫科第二級

能勢琢　新潟
吾妻健三郎　置賜
鈴木守三　三潴
永田直孝　東京
宇野要　飾磨
三宅正雄　名東
間瀬正信　愛知

長島景福	同
成田久楢	和歌山
松野道雄	東京
藤田賢	山口
竹澤作次郎	千葉
藤宮規平	新潟
原文三	靜岡
小林堅造	廣島
大橋泰雲	埼玉
高原平太郎	名東
田村正昭	高知
赤城正龍	東京
下村廣畝	筑摩

河野通和　京都

同豫科第二級

武田安之助　廣島
日高生孝　山口
松岡六郎　三瀦
井上亦造　廣島
稻桒七穗　愛媛
今都武四郎　筑摩
高木宗造　京都
高橋源吉　東京
戶澤惟允　青森
小林太喜馬　長野
神山正士　東京

鹿田三郎　石川
喜多島孝一郎　山梨
西郷正義　筑摩
寺地保五郎　廣島
伴守成　京都
野中一郎　長野
吉武滿平　筑摩
鹽見規　敦賀
山口友之助　豐岡
宮城貫造　堺
吉津新之　熊本
小川厚美　高知
佐藤直　愛知

信太正己　大坂

製作學教場生徒

製煉豫科第一級

田邊元三郎　新潟

矢島大介　東京

田村典瑞　櫪木

川地方敬　筑摩

品川衛夫　飾磨

菅原安樹　新潟

喜多見久道　愛知

高津達一　山口

河原匡　長野

難波　　正	岡山
上田　文造	飾磨
桐山篤三郎	長崎
赤木　周行	岡山
三輪桓一郎	東京
三守　　守	名東
保田　棟太	大分
茂原　　高	磐前
鹽田　仁松	廣島
岡田　秀男	石川
長谷川正道	濱松
中村　　行	石川
渡邊知一郎	靜岡

中村	精男	山口
和田	雄次	福島
鮫島	晋	新潟
加瀬	代助	東京
川上幾	太郎	石川
高野瀬	宗則	滋賀
野々山	昌美	東京
野本	彦一	廣島
林	忠正	石川
池田	稔	豊岡
小林	有也	堺
水谷	忍	東京

同　試驗未濟

同豫科下級

同

加藤　順五　石川

物理學專門科下級（佛語）

寺尾　壽　福岡

櫻川　房記　石川

千本　福降　東京

中村　恭平　愛知

信谷　定爾　東京

緒方　重三郎　同

同豫科上級

谷田部梅吉　秋田

豐田　周衞　廣島

香川　義一　同

福井彦二郎	大坂	
加藤常七郎	千葉	
鹿島卯之吉	東京	
嘉納龜松	同	
大八木喬朶	高知	
下村三一	豐岡	
鈴木允美	三重	
關信一郎	東京	
高橋茂	熊本	
坂井勝寛	高知	
熊倉泰三	新潟	試驗未濟
岡田乾三	東京	同
橋槐二郎	香川	同

前田元敏	高知	
末岡楠一	山口	試驗未濟
天野秀之	長崎	同
古村政行	石川	同

第三級丙

原龍太	福島
本多孫四郎	長崎
合川太郎	岐阜
堀田連太郎	長野
坂口佐吉	新潟
中川久知	東京
松野貞一郎	青森
高橋[illegible]太郎	堺

坪井九馬三　東京
都筑馨六　同
富士谷孝雄　同
秋山正議　同
加藤高明　愛知
加納伸之助　兵庫
飯島魁　東京
水原彦太郎　山口
九里龍作　大坂
松田小次郎　東京
田中稲城　山口
久田孝太郎　石川
岩川友太郎　青森

菅谷正樹　熊ヶ谷
足立震太郎　千葉
土田銕雄　石川
服部福松　東京
吉川俊吉　同
田邨友輔　三潴
坂本滿房　東京
久後元長　同
黒岩四方之進　高知
眞崎健吉　三潴

試驗未濟　同

第三級乙

白石直治　高知
野村龍太郎　岐阜

元田肇 大分
渡邊友三郎 堺
巨智部忠承 長崎
木場貞長 鹿兒島
和田垣謙三 豐岡
牧野是利 鹿兒島
大久保利和 同
丹後直平 新潟
加瀬紐次郎 東京
岡倉角藏 敦賀
青山元 同
橋口直右衞門 鹿兒島
水尾小三郎 三潴

試驗未濟　同

坪田秀清	同
福島廉平	敦賀
西郷久道	東京
中村久恒	高知
宇田川三郎	東京
島田義誠	同
寺地左吉	廣島

第三級甲

甲賀宜正	靜岡
倉田吉嗣	長崎
國府寺新作	飾磨
石川巖	同
船越哲次郎	福岡

松本　收　岡山
岡　胤信　東京
大野金三郎　飾磨
柳　壯藏　名東
福富　孝季　高知
青木元五郎　橡木
田上　省三　岡山
佐分利　隆　同
山下　傳吉　熊ヶ谷
小柴　保八　千葉
佐々木忠二郎　敦賀
城多　虎雄　滋賀
城戸　種久　東京

試驗未濟

同

藤川次郎　同

山本謙三　新潟

夏目大一　東京

第二級乙

吉田朋吉　石川

笠原挌　敦賀

吉田彥六郎　廣島

宮崎道三郎　三重

上野昭道　石川

今井省三　靜岡

守屋物四郎　岡山

石田二男雄　敦賀

松浦佐用彥　高知

秋山源藏　千葉
内田三省　同
野尻武助　東京
渡邊鋏二郎　長崎
坂田貞一　東京
坂崎直道　高知
河野俿雄　熊本
山中英　熊ヶ谷
臼井潭　東京
肥田密三　靜岡
遵池惟孝　東京
入江鷹之助　石川
福田東吾　東京

末延佐代次　高知
高橋一勝　熊ヶ谷
村山文三郎　石川
梅谷順治　飾磨
石藤盟太　廣島
大森俊次　山梨
織田顕二郎　靜岡
宇野忠寛　同
山下雄太郎　高知
日下部辨次郎　滋賀
中隈敬造　三潴
中澤岩太　敦賀
杉岡政久　石川

三宅常倫　石川
喜多村彌太〻　東京
千頭清臣　高知
西松二郎　長崎
大前寛忠　東京
河原勝治　青森
福島住長　千葉
中久木信倫　東京
曾根誠太郎　同
田寺鐘一　靜岡
試驗未濟
同
同
死亡

第二級甲

山崎秀德　岩手
橘協　石川

川上新太郎　東京
富谷光孚　同
和田正幾　靜岡
河郁勇　同
大原鎌三郎　東京
平岩愃保　同
小藤文次郎　島根
鈴藤安六　熊ヶ谷
増島六一郎　滋賀
松崎藏　三豬
二見鏡三郎　千葉
磯野斗　岡山
大谷木備一郎　東京

竹尾將信	東京	
鈴木俊三郎	石川	試驗未濟
種田織三	開拓使	同
小林恒之丞	東京	同

工學下級

北鄕重孝	高知
石黒五十二	石川
仙石貢	高知
中久木信順	東京
岡田一三	石川
三田善太郎	橡木

普通科

第一級

宮崎道正　敦賀

同下級

岩谷立太郎　滋賀

大島道太郎　岩手

石松定　福岡

伊藤新六郎　茨城

磯野徳三郎　三潴

高山甚太郎　石川

渡邊洵一郎　埼玉

高松豐吉　東京

渡邊渡　同

小林啓之助　同

福田良作　同

西川鐵次郎　青森
高橋健三　千葉
河上謹一　山口
高山重明　東京
山岡義五郎　廣島
久米晡吉　岐阜
本山正久　東京
大木房英　同
松村任三　茨城
江澤一馬　東京　死亡

化學中級

高須碌郎　東京
久原躬弦　岡山

同	同	關谷清景	岐阜
同	同	增田禮作	大分
同	同	谷口直貞	堺
在佛	明治八年七月派遣	古市公威	兵庫
同	明治九年六月派遣	山口半六	島根
同	同	沖野忠雄	豐岡
在獨	明治八年七月派遣	安東清人	熊本

専門科（以下姓名第七月定期試業ニ因リ定ムル順次ヲ以テ記スルモノナリ）

法學中級

野村鈴吉	熊谷

同下級

藤田隆三郎	愛媛

同　同　小村壽太郎　宮崎
同　同　齋藤脩一郎　敦賀
同　同　菊池武夫　岩手
同　同　松井直吉　岐阜
同　同　長谷川芳之助　三潴
同　同　南部球吾　敦賀
同　同　平井晴次郎　石川
同　同　原口要　長崎
在英　明治九年六月派遣　入江陳重　愛媛
同　同　岡村輝彦　東京
同　同　向坂兌　栃木
同　同　櫻井錠二　石川
同　同　杉浦重剛　滋賀

關係運動

第一　一平面上他平面ノ移動○瞬時轉心○容及轉柱

第二　一定點ノ周圍ニ一固體ノ移動○瞬時轉軸○容及球形轉柱

第三　一固體ノ不定移動○瞬時轉軸及螺軸○容及圓錐形轉柱

關係運動中集成化速度

コリオリー氏定則

運動ノ組立

第三　動勢學

第一　單點ノ動勢

原則

不易力ニ因テ起ル所ノ運動

力ト加速度トノ關係

直線運動○等時[illegible]

教レハ必ス一々其應用ヲ授クベシ

第一　靜勢學

靜勢學ノ原則

同一點ニ受クル所ノ衆力ノ組立○力率

平行力ノ組立○力率○重心

一切力ノ組立○力率○均勢方程式

雙力ニ由テ力ヲ組立ル法○雙力理論

定地ヲ有スル點若シクハ固體ノ均勢

綱類ノ受ル所ノ力ノ均勢○鈞橋○屈折スヘキ糸ノ均勢○小鎖

第二　運動學

速度及其分素

加速度及其分素

高等ノ加速度

第三　重學

第一年　初步重學

靜勢學初步

運動學初步

動勢學初步〇力ノ作用

最モ單簡ナル機械即チ桿天秤滑車及刎滑車廻軸擧重器斜面〇摩力規律及應用

第二年　高等重學

論理重學

（運動學ハ數學中ノ微積二法ヲ要スルヿ多キガ故　本年第二期微分法已ニ進步ノ後ヲ俟テ之ノ授ク）凡ソ一理論ヲ

倚定數理論〇除去法理論

微分

諸自變數之函數ノ諸級微分〇増極及減極ノ理論〇單曲線、複曲線及曲面ノ理論〇曲面上畫線ノ理論

第三年　高等數學

積分

微分ノ還原〇定積分ノ理論〇積分術ノ用テ曲線ノ積及長ヲ求ムル法〇層積分ノ理論〇積分術ノ用テ曲面ノ平積及曲體ノ立積ノ求ル法

微分方程式ノ總論〇二個ノ自變數ノ有スル第一級及第二級以上ノ微分方程式還原〇部派式ヲ有スル方程式還原

數理總論

直線○圓○第二級曲線○中心、經心線觸線、漸近線及ヒ應點ノ理論○直線極點ノ二定位式ニ於ノ曲線ノ作爲法○類似法○包含線○圓柱形及圓錐形曲ノ平截

立面代數幾何學

直線○平面○球○第二級曲面ノ理論○側圓形曲面○雙曲線形曲面及其漸近圓錐○擲物線形曲面○圓錐形及圓柱形曲面○旋轉曲面

畫法幾何學　理論及幾何圖）

錐形及柱形曲面及旋轉曲面ノ觸面○圓錐形、圓柱形及旋轉曲面ノ平截○錐形若シクハ柱形二曲面ノ相截線○二旋轉曲面ノ軸々相遇フ者ノ相截線○第二級ノ一切曲面ノ相截線○陰畫法

第二年　高等數學

高等代數學

直線聚極○光線感觸○側圓聚極
帶色聚極○單軸及複軸水晶中ノ混明線及中立線○輪旋聚極○驗糖器

第三　實驗

第二　數學

豫科

算術　幾何學　代數學　三角法　畫法幾何學

第一年

追補代數學

ニウトン氏合名法○不盡聯數○代數對數○派式理論○代數及不直接方程式理論及其解法

平面代數幾何學

第三年　高等物理學

本年ハ微積二法ノ算計ヲ要スル近世發見ノ學科ヲ授クルタメ、備フ

第一　聽學

同質物中震動ノ廣衍

震動ノ組立

仝上ノ活用（音響ノ廣衍）鳴管、震動線及ヒ震動板

第二　視學

精氣ノ震動○波狀及彈力ノ面

光波ノ反射及屈曲

フィヅー氏及ヒフーコー氏光線ノ速度驗定法

天然光線ノ感觸○フレスノル氏諸鏡ノ混明線、二重三稜玻璃柱、ニュートン氏複輪、光線岐行及明暗線○光波ノ長サヲ度ル法

第二　熱學

寒暖ヲ度ル法第一ハ固體、液體或ハ氣體ノ膨脹ニ因テ度リ第二ハ複合體ノ分離力ニ因テ度ル法、不結晶若シクハ結晶ノ固體膨脹ノ八角體及側圓結液體及氣體ノ膨脹

射熱○デュロン、プチ二氏失熱律

第三　磁學

磁氣曲線ノ力程式

ガウス氏試驗

第四　動電作用及磁電作用

流電ト流電ノ作用及流電ト磁氣ノ作用

○全上ノ結果

第五　實驗

靜越歴學
動越歴學
磁電作用
聽學
幾何視學

第二年　高等物理學

第一　重力學

擺理論追補
重力ト六合ノ引力ト同一ナル論
地球ノ表面ニ於テ重力ノ變化セシムル諸原素ノ精算
氣體靜勢學追補○自點晴雨儀○晴雨儀整定法○晴雨儀ヲ以テ土地ノ高低ヲ度ル法○液體中氣體溶解律○毛狀管浸潤作用

明セントト欲スル必ス數學及重學ノ一科ノ講究スルニ外ナラザレバ能ハザルヲ以テナリ

第一　物理學

豫科　初步物理學

物理學ノ目的

物體普通ノ性質

重學初步大意

重力學及靜水學

熱學

磁學

第一年　初步物理學

シム

（第一）測地學ノ課ハ講義ヲ以テ三角測量法測地學及ヒ地球ノ外形ニ關スル問題ヲ說明ス

（第二）溝渠、水門、水樋、乾地ノ諸法及ヒ山中ノ放水法ヲ課ス

（第三）航行スヘキ河底ヲ修整シ且ツ其堤岸ヲ防禦スル法ヲ課ス

（第四）海岸ノ修整法即チ港灣船渠埠頭等ノ造築等ヲ課ス

右諸課ノ授業方法ハ都テ實地ニ關渉スルモノニシテ器械ノ取扱及ヒ繪圖及ヒ計算ノ方ヲモ併セテ習練セシムヘシ

物理學科要略

本校設置ノ佛語ヲ以テ敎授スル物理學專門科ノ目的ハ該學高尚ノ諸科ヲ敎授セシムルニ適當ナル敎員ヲ育成スルニ在リ故ニ該學ハ數學及重學ノ二科ノ如ク是則物理學中近世發見ノ理論タ

(第三)前條ノ課目ト共ニ生徒ハ測量シタル土地ノ分圖及ヒ全圖ヲ作ル方法及ヒ地誌圖ニ用フル常用記號ノ法式ヲ學修ス

第二年ノ課目ハ左ノ如シ

(第一)道路修造法即チ地所ノ撰定法道路ノ築造法路床ニ用フ可キ物料及ヒ市中鋪石法等ヲ課ス

(第二)鐵道測量學即チ鐵道線ノ地形調査水準測量法弧線路堀鑿幷ニ堤防ノ指標及ヒ計算若手スヘキ工業ノ部分ケ圖及ヒ詳細書ノ製出スル法等ヲ課ス

(第三)工業ノ經營ニ用フヘキ物料即チ木材煉化石金屬石類幷ニ亞土及ヒ和土等ヲ課ス

(第四)木石及ヒ鐵ヲ以テ築造スル諸工木石或ハ鑄鐵ノ材ヲ以テ築造スル橋及ヒ釣橋ヲ課ス

第三年ノ間ハ生徒ヲシテ測地學及ヒ屬水工業ニ關スル課目ヲ學修セ

(第二)用水工事港灣工事市井放水法ニ適用スヘキ器械用法ニ此年ノ一部ヲ用ユヘシ

(第三)生徒ハ此年ノ間主モニ計畫室ニ於テ其時ヲ費ヤシ且ツ工業必需ノ書籍ヲ習讀シ尤モ各生徒ノタメニ指定スル實地工業及ヒ參看書籍ハ其修メント欲スル所ノ工學ノ課ニ從テ同シカラサルヘシ

第十六　土木工學

土木工學ハ機械工學ト課程ヲ同フシ工學科ノ生徒之ヲ學修ス其課目左ノ如シ

(第一)第一年ノ間ハ生徒專ラ陸地測量ヲ講習シ野用器械ノ用法ヲ學ヒ實地測量ヲ爲シ而シテ必要ナル圖面及ヒ計算ヲ作爲ス可シ

(第二)此年ノ間ニ又水準測量法幷ニ地誌必需ノ諸法「プレーンテーブル」測器ノ用法ヲ敎授ス

或ハ滊罐ノ功力ヲ論シ次ニ數理熱動學ヲ修メ而シテ最後ニ熱動學ノ理ヲ蒸氣機及ヒ空氣機ノ功力ノ實際計算ニ使用スル法ヲ學ヒ且ツ蒸氣機試驗ノ法式ヲ明カニス

（第三）生徒ハ又機械ノ摩擦功力ノ理論ヲ講究シ且ツ機械ノ摩擦スル諸部ノ構造ヲ論スル講義ヲ聽聞スヘシ此年ノ第二期ニ生徒ハ工塲實驗ノ最要ナル詳說ヲ學ヒ且ツ機械ヲ運轉セシムヘキ力ノ計算法ヲ學フヘシ

第三年　專門科上級

第三年間ニ生徒ノ學習スヘキ學科ハ全ク實地ニ渉ルモノトス

（第一）海陸蒸氣機及ヒ翅蝶等ノ計畫ヲ詳細ニ講解シ而シテ入費ノ見積及ヒ圖式ニ關係スル諸ノ必要ナル計算ハ生徒ヲシテ自ラ之ヲ做サシム若シ餘暇アルトキハ講義ヲ以テ機械器具及ヒ造船ノ計畫ヲ說示スヘシ

テ各自室内ノ練習ニ依テ其講義ノ時説明セシ諸題諸式ノ數目ノ結果ヲ十分ニ解得スルヲ要ス

(第三)生徒ハ物質強弱論ヲ學ブベシ又各種物料ノ形狀及ヒ大小ニ準スル比較價及ヒ時價ノ浮沈ヲ研究シ尚ホ一層此學科ニ熟達ス可キ目的ヲ以テ生徒ハ各自ラ各種ノ試驗器械ヲ用テ實驗ヲ行ヒ而シテ其經驗ノ結果ニ就テ物質ノ強弱等ヲ算計ス可シ但シ其經驗スル所ノ物料ハ大抵日本產出ノ物ヲ用ユ可シ

第二年　專門科中級

第二年間ニ研究スヘキ學科ハ大略左ノ如シ

(第一)生徒ハ物質強弱ノ理及ヒ試驗上其理ノ歸著スル原由ヲ流鐵橋梁及ヒ機械ノ質地ノ計畫ニ適用ス可シ

生徒ハ又熱動學ヲ通曉スベシ殊ニ其實用ニ供ス可キ部分ヲ詳細ニ研究スベシ其法先ツ竈中火熱生起ノ理或ハ薪炭焚燒ノ理ヲ講シ其後竈

一數學
一幾何圖法及ヒ自在畫法
一物理學及ヒ無機化學

第一年　專門科下級

此學則ノ第一年ニハ生徒左ノ課目ニ從事ス可シ

(第一)生徒ハ機械ニ適用スベキ幾何圖法ヲ引續テ學習ス可シ其演習題ハ成ルベキ丈ケ生徒ノシテ機械諸部ノ圖ヲ畫ク法ニ慣熟セシム可キモノヲ撰出ス生徒ハ又工學計算ノ諸種ニ適用スヘキ圖畫推算學ノ學習及ヒ實際使用ニ多ク其時ヲ用ユ可シ圖畫推算學ノ目次ハ則チ圖畫算術、圖畫代數、圖畫動勢法、圖畫靜勢法、ニシテ順序ニ從ヒ之ヲ講ス但シ圖畫靜勢法ニ於テハ屢々實際ノ使用ヲ器械及ヒ橋梁ノ諸部強弱ノ計算ニ施ス

(第二)生徒ハ重學及ヒ機械構成法ニ於テ一層高等ノ科ヲ修ムヘシ而シ

銅。亞鉛。錫。鉛。

銀。金。白金。

水銀

ニッケル及ヒコボルト

其講義ハ數多ノ圖式、鎔爐、鑛類、金冶ノ見本ヲ以テ說明シ而シテ試金術ノ實地經驗・必用ノ諸器械ヲ備ヘタル冶金試驗室ニ於テ第三年生徒ニ之ヲ授ク

第十五　機械工學

機械工學ノ專門科ニ入ル生徒ハ先ツ普通科ヲ卒業セサル可ラス又他ヨリ來リテ入校ヲ願フ者ニ至テハ普通科ノ課目ニ均シキ學術ノ試驗ヲ經ザルベカラズ特ニ左ノ課目ニ學力アルヲ要ス

一英語

硝子　陶器　磁器

白堊　和土(シメント)

砂糖精製法

造醸　葡萄酒製法

樹脂及ヒ獸脂　石鹸　蠟燭類

破裂物　火藥　火藥綿　「ナイトログリサリン」

第十四　冶金學(メタルレヂー)

冶金學ノ講義ハ先ツ最要ナル冶金法ノ大意ヨリ鎔爐ノ造築ニ使用シテ火力ニ堪ユヘキ物料及ヒ鎔鑛ノ用ニ供スヘキ燃料ノ説ヲ擧ケ次ニ最モ緊要ナル金屬ノ鎔鑄ニ使用ヒル鎔爐ト其方法トノ詳説ヲ述ブ此學科ハ最モ日本ニ適用スヘキ方法ニ注意シ左ノ順序ヲ逐テ之ヲ授ク

鐵及ヒ鋼

醋酸　ナフサ
鑛油　焼燈及ヒ點光ニ使用スル法
硝石　硝酸
硫黄　蒸餾精製法
硫酸硫酸曹達、炭酸曹達製法
鹽酸　鹽素　晒粉
剥篤斯及ヒ曹達鹽類
マグチイコム　アルミニム
ブローム鹽　沃的丹
第三年間ニ授クル箇條左ノ如シ
染料鑛物及ヒ有機物
晒布法
染物　更紗染

質及ヒ分量ヲ分析シ食料ノ混和物幷ニ毒劑ヲ發見スルノ術ヲ敎フ

第十三　製造化學（ケミカルテクノロジー）

製造化學ノ講義ハ化學專門科第二年第三年間ニ授ク第二年ニハ左ノ箇條ヲ講說シ而シテ講義ノ時說明セシ製造法ハ成ルベク實驗ヲ以テ示シ又ハ圖式幷ニ製造品ノ見本ヲ以テ之ヲ示ス

燃料及ヒ其使用

薪　泥炭　石炭

燃燒及ヒ分離ヨリ生スル品物

木炭　コーク

瓦斯　點火術

タール　タールヨリ製出スル物料

瓦斯製造ヨリ生スル贅物

分析化學ハ重モニ化學試驗室（ケーカル・ラーリー）ニ於テ實地ニ之ヲ教授ス其學期ハ化學專門科三ケ年間ナリ

生徒ハ先ツ金屬及ヒ非金屬ノ諸元素一般ノ性質ヲ學ヒ各種ノ化學藥劑ノ製煉ヲ以テ手術ノ習練シ然ル後專ラ諸元素ノ性質ヲ實地ニ研究セシメ以テ他日分析中其有無ヲ發見スルノ資トス又時々生徒ニ物品ヲ與ヘテ其性質ヲ攷察セシメ各々自己ノ分析法ヲ筆記シテ之ヲ教授ニ出サシメ以テ其學術ノ進歩ヲ考試ス生徒斯ク序ヲ逐テ諸元素ヲ研究シタル時ハ乃チ諸ノ天工及ヒ人造ノ混合物ニ就テ其形質ヲ攷定セシム

生徒撿質分析術ヲ學ヒタル時ハ次ニ定量分析術ヲ教授ス其法ハ極メテ簡單ノ事ヨリ始ム例ヘハ單性鹽類ヲ與ヘテ其成分ノ量ヲ定メシムルカ如シ生徒其術ニ熟達シテ信スヘキ成果ヲ獲ルニ至ラハ則チ諸ノ金石及ヒ製造物ノ分析ニ遷ラシメ貨幣及ヒ鑛類ヲ試驗シ有機体ノ形

テ嚮キニ講室ニ於テ敎授ノ示シタル試驗ヲ再ヒ演習セシメ以テ化學專門科ニ入ラントスル輩ヲシテ豫メ化學ノ反應ト手術トノ大略ヲ知ラシム

化學專門科ノ第一年間ニハ生徒ニ授ルニ有機化學ヲ以テス則チ有機物ノ百工製造ニ要用ナルモノト化學ノ理上ニ特殊ノ關係アルモノトヲ詳說シ數多ノ試驗ヲ交ヘテ之ヲ講解ス

參考書目

一ブロキサム氏著　化學書
一ファウンス氏著　化學書
一ショーレマル氏著　炭素抱合体化學書
一ワット氏著　化學字典

第十二　分析化學（アナリチカルケミストリー）

ー(衡平法ノ義)訴訟法、海事訴訟法、ノ如キ法律實施ノ業ヲ專攻セシム又餘暇アル時ハ第一年ニ初メタル學科ヲ續修セシム羅馬法律ハ學フト學ハザルトヲ生徒ノ意ニ任ス

第三年

第三年ニハ列國交際法ノ二支口即チ公法及私法ト法論トヲ學ハシムルヲ以テ本旨トシ旁ノ前二年間ノ學業ヲ續修且復習セシメ且ツ那破崙法律ノ要旨ヲ學ハシム總テ是等ノ學科ハ教授ノ講義ト適當ナル書籍トニ因リテ學修セシムル者トス

第十一　普通化學(セネラルケミストリ)

無機化學ハ普通科第三年ニ之ヲ授ク其法先ツ物質ノ抱合及分離ノ總則ヲ教ヘ而後數多ノ試驗ヲ交ヘテ諸元素幷ニ其最要ナル抱合体ノ性質ヲ講說ス又試驗室ニ於テ化學ニ須用ナル器械藥品ヲ用井生徒ヲシ

第十　法學

昨年印刷ノ學校一覽ニ載セタル法學ノ課程ニ少シク改正ヲ加フルハ日本古今ノ法律ト日本法律ノ淵源タル支那法律トフ一層學修セシメン爲ナリ而シテ是等ノ學科ハ三年間敎授ニ從ヒ學修セシムルヲ定規トス

課程概目左ノ如シ

第一年

第一年中學修セシムルモノハ(甲)不動產及ヒ動產法(乙)結約法該法ニ屬スル商業委任法、兌換證劵法、物品委托法保險法組合營業法賣買法ノ旨趣(丙)刑法及私犯法(丁)國志ニシテ但シ國志ハ學フト學ハサルトヲ生徒ノ意ニ任ス

第二年

第二年ニ於テハ數種ノ訴訟法、卽チ民事訴訟法、刑事訴訟法、チエンセリ

此講義ハ木材ノ構ヘテ造成シタル直坑斜面等ヲ示シ又ハ捲揚及ヒ喞除ノ用ニ供スル機器運送車轍路及ヒ採礦器等ヲ示セル數多ノ採礦雛形ヲ假リテ說明ス

休業中生徒ヲシテ礦山或ハ鎔礦場ヲ巡廻ヒシメ歸校ノ節其遍歷中ノ錄事ヲ敎授ノ許ニ出サシム

第九　書學

普通科學期中ニ授ル所ノ畫學ハ第一年及ヒ第二年ニ專ラ自在畫法ヲ敎ヘ而シテ第三年ニ用器畫法ヲ敎フ

工學生徒ハ專門科ニ至テ其學術ニ關係シタル圖畫ヲ學習セシム機械工學ノ敎授機器圖幷ニ圖畫推算學ヲ敎ヘ土木工學ノ科ニテ地誌圖ヲ敎ユ

第八　採礦學

採礦學ノ講義ハ地質學ノ講義ニ次テ專門科上級ノ生徒ニ之ヲ授ク此學科ニ從事スル時期ハ短キニ以テ其講究スル所ハ極メテ要領タルヲ免カレスト雖𪜈日本ノ採礦法ハ他國ノ理論ト實驗トヲ參考シテ詳細ニ解說ス

竟ニ確實ノ成規ノ踏ンテ礦物ヲ搜索スル法、地質ニ從テ地方ヲ細査スル良法、幷ニ礦物ノ藏所ヲ測量スル法ヲ講說シ然ル後井ヲ穿チ溝ヲ堀リ又ハ鑽鑿シテ預試スルヿ要鑿ニ便ナル場點ヲ撰定スルヿ礦物ノ藏所ニ達スルタメ隧道、斜面或ハ直坑ヲ造築スルヿヲ包括セル開礦ノ術ヲ說キ次ニ新氣流通ノ法、物品ノ運送及ヒ捲揚方、坑水ヲ放乾シ及ヒ剷除スルヿ等ノ包括セル地下工作ノ實際ニ適スル諸般ノ方法ヲ詳論シ以テ此科ヲ終フ

沿革地質學ノ講義ハ上古ヨリ今時ニ至ルマテ各種ノ地層ヲ造成セル物質ノ本性ヲ講解シテ此物質ノ位置ト其内ニ埋沒セル動植物ノ遺跡トヲ明カニス

其他種々ノ年紀ニ屬スル地層ノ位置ヲ說キ生徒ヲシテ其内ニ存在セル有用金石ハ何物タルヤヲ知ラシム且ツ時有テハ地質造成ノ次第ヲ復講シ地質年代ノ間ニ起リタル地球變遷ノ概略ヲ圖示ス

右課目ヲ終リタル時ハ日本地質ノ講義ニ遷リテ殊ニ本島防長ヨリ奥羽ニ至ルマデノ本島ノ地質ヲ說明ス又地質測量ノ最要理ヲ說示シ且講義ノ參考ヲ云フニ備フヘキ若干ノ圖表等ハ常ニ生徒ノ縱覽ヲ許ス又宇内ノ諸邦ヨリ蒐集シタル石質學古生物學及ヒ地質學ノ見本アリ別ニ地理ニ從テ排列シタル日本地質ノ見本一部ハ專門科最後ノ使用ニ供ス

夏季休業ノ間內國地質ノ調査トシテ教授ノ旅行スルトキハ級中優等ノ生徒數輩ヲシテ之ニ隨行セシム

覽閲ニ供ス本年期中ハ生徒ヲシテ專ラ實驗ニ習練セシム其法ハ若干ノ結晶模型或ハ無銘ノ金石見本ヲ之ニ給與シ或ハ唯其外貌ニ就テ之ヲ鑒定指名セシメ又ハ教授ニ從テ物理學或ハ化學上顯著ノ性質二三ヲ質問シ教授ヨリ應答ノ助ヲ借リテ之ヲ鑒定指名セシム

專門科下級第一年ニハ化學生徒ヲシテ此學科ヲ繼續シ稀有ノ金石ヲ攷覈セシム教室ニ於テ實驗ニ習練セシムト雖𪜈金石ノ梗硬、條痕、結晶狀、比重、吹管反應等ノ如キ物理上ノ性質ノ判斷スルニ必要ナル手術ハ總テ生徒ヲシテ自ラ之ヲ傚サシム

第七　地質學

專門科第二年ニ地質學ヲ敎ユ其講義ハ先ツ地文地質學（フィソオグラフィックジオロジー）地球ノ外貌山嶽河海等ヲ論スル科變原地質學（ダイナミカルジオロジー）地層變更ノ起原ヲ論スル科并ニ石質學古生物學ヲ論シタル後重モニ沿革地質學（ヒストリカルジオロジー）ヲ說ク

見慣レタル內國產出ノ見本ニ就テ直チニ其學ブ所ヲ研究セシメ以テ生徒學科ヲ瞭解スルノ一大助トス

第六　金石學

普通科第三年ノ初期ニ金石學ノ起端トシテ結晶學ヲ始メ木製及ヒ玻璃製ノ結晶模型ナ假リ以テ眞形ト理形トヲ講シ生徒ニ教フルニ啻ニ單純規正ノ結晶ノミナラス尋常實地ニ顯ハルヽ所ノ交結形、半面形及ヒ歪形ノ識別方ヲ以テス

同年中之ニ次クニ金石學ノ初步ヲ以テシ生徒ナシテ書物ニ就キ化學上ノ抱合、物理學上ノ性質發現ノ模樣及ヒ尋常有用ノ金石ノ用途ヲ學ハシメ且ツ本校所藏ノ金石見本ニ就テ之カ外樣ニ慣熟セシム千餘箇ノ見本一部ハ隨意觸手ノ許可ヲ與ヘタル生徒ニ限リ常ニ之ヲ使用スルヿヲ許ス然レトモ四千餘箇ノ見本ノ本部ハ上ニ玻璃ヲ掩ヒテ唯其

爲シ且ツ此數式ヲ用井テ實際ノ問題ヲ解釋スル法ニ專ラ注意セシム第二年ニ生徒ハ試驗室ニ入リ各種器械ノ用法ヲ學ヒ且ツ多般ノ試驗ヲ倣ス生徒ハ試驗ニ從事スルトキ獨リ造化諸力ノ功用ヲ觀察スルノミナラズ又力ノ及フ丈ケハ之ヲ測度セサル可ラス斯ク其觀察上ノ結果ト計算上ノ結果トヲ比較シ以テ萬物自然ノ規則ヲ驗シ又規矩ニ從テ學科中ノ各件ヲ考究シ而シテ其手段ト結果トノ有用ナル可キモノハ登錄シテ以テ後ニ存ス

第五　動物學及ヒ植物學

普通科ノ二ケ年ヲ此學科ニ分賦ス日本ノ博物學ヲ講明センカタメニ現今大ニ力ヲ盡シテ諸品ヲ蒐集シ而シテ之ヲ分類セリ

生徒ヲシテ自ラ勉メテ動植物ノ見本ヲ搜聚セシメ又動植物學ニ關渉セル日本諸家ノ著書ニ就テ其見聞ヲ廣メシム此科ニ於テハ斯ク常ニ

一六合中ノ引力
一天體ノ光
一大氣中光線ノ現像
一地上ノ寒暖
一大氣ノ壓力及ヒ流動
一水氣象學(ハイーロメテオロヽヂー)即チ雲、雨、雪、霰等ノ論
一大氣中ノ電氣
一大地ノ磁氣力

第二　專門科

專門科ニ於テ物理學ヲ授クル目的ハ二アリ一ハ數理ヲ適用シテ重學ニ次テ修ムル所ノ諸科ヲ一層精密ニ學ハシムルニ在リ又一ハ試驗室ニ於テ實地習練ヲ做レ以テ手術ニ熟達セシムルニ在リ

第一年ニ聽學并ニ熱、視、電、磁、四學ノ講義ヲ授ク又物理學上ノ數式ヲ設

第一　普通科

普通科ニ於テ物理學ヲ課スル目的ハ生徒ヲシテ世ノ學者殊ニ術藝家タル者ノ知ラスンハアル可ラサル物理ヲ學ハシムルニ在リ其敎授法ハ先ツ平易ノ講義或ハ談論ニ旁ラ實驗ヲ交ヘテ學科ノ全躰ヲ講過シ生徒ニハ適宜ノ書物ヲ渡シ置キテ屢ヤ其書幷ニ講義中ノ意義ヲ査問シ以テ學科ノ語ニ習熟シ造化諸力ノ最モ緊要ナル功用ヲ實見シ且ツ其功用ヲ說明セシ通說ヲ略知セシム斯ク一年ハ大略ノ修業ニ從事セシムルナリ

普通科第三年ノ初期ニハ生徒數學ニ上達シテ勢力論（ダイナミックス）(靜勢法（スタチックス）及動勢法（カイナチック）)ノ理ヲ固、液、氣、三體ノ重學ニ適用スル法ヲ學ブニ堪ユ可キヲ以テ乃ナ此課ニ從事セシム同年ノ第二期ニハ萬有物理學（コンミカルフヒシックス）ニ屬スル諸項ヲ敎授セシム其目左ノ如シ

一　天體ノ運動

ハ教科書トシテ「ドクトルヘブン」氏所著ノ書ヲ用フト雖トモ又自己ノ解剖分類ノ以テ其說ヲ述ベ又論文ヲ作リ而シテ批評スベシ

第三　數學

普通科ニ於ノ授クル所ノ數學ハ專門科ニ入ルノ階梯タルヲ以テ高等ノモノニリラス則チ初年ニハ代數學ヲ學ヒ方程式總論ニ至リテ止ミ且又幾何學初步ヲ學フ

第二年ニハ代數及ヒ幾何ノ二學ノ卒リ第三年ニハ三角法、圓錐曲線法、及ヒ代數幾何學ヲ卒ル高等數學ハ工學專門科生之ヲ學ブ

第四　物理學

物理學ハ普通科ノ第二年及ヒ第三年ニ之ヲ教ヘ又化學、工學等ノ專門科ノ第一年及ヒ第二年ニ之レヲ教フ

一アンドルウード氏著　英文學袖珍

一ヘブン氏著　修辭學　ベーン氏著　同書

一フォーレル氏著　演繹論理學

一シェークスピール

第二　史學　理學

本校ニ入ル所ノ生徒ハ豫シメ萬國歴史ノ大略ヲ領知セサルベカラズ入校第一年ノ初期ニハ「スチューデント、ヒューム」ヲ以テ敎科書ト做シ英國史ヲ研究スヘシ而シテ其第二期ニハ「チェムブル」氏ノ佛國史ヲ研究スヘシ且ツ問題ニ應シテ論文ヲ作ルベシ

第二年ノ間ハ全ク史學理論（フヒロソフヒーヲフヒストリー）ニ從事スベシ敎授（プロフェツソル）講義ヲ以テ史上ノ形勢ヲ論スルトキハ生徒其主意ヲ書取リ而シテ之カ論文ヲ作ルベシ

第三年ノ初期ニハ心理學ヲ課シ而シテ第二期ニハ修身學ヲ課ス生徒

諸學科要略

第一　英文學　修辭學　論理學

英語學及ヒ英文學ノ科ハ英語ノ起原發達文法及ヒ作文法幷ニ英文ノ起原隆興及ヒ性質ノ諸項ヲ包括シ併テ英語及ヒ英文ノ進歩ト之カ變化及ヒ更善ヲ生シタル感力トヲ講明ス

修辭學ノ科ハ一論題ニ關スル引證又ハ推理ノ正シキ布置法、幷ニ散文體ノ潤飾法、言語ノ用法、文詞ノ美妙論、語氣論、趣味、批評、等ヲ課ス

論理學ノ科ハ演繹歸納ノ兩論法ヲ課シ時々辨論術ノ歷史ヲ講說ス

生徒ハ英文ヲ以テ廣義ヲ作リ、抄錄ヲ做シ、論文、演說、批評、討論、等ヲ草シ說略、索引ヲ製シ或ハ公務又ハ商用ニ關スル文書ヲ作ル可シ

敎科書目

一マルシ氏著　英語歷史

一モルレー氏著　英文學歷史

第二年

第一期

重學

機械諸部製造

工作本科

一年半

工作實試

工作豫科

第一年

第一期

算術

物理學

無機化學

第二期

代數

幾何

三角法

工器使用

野書

罫書

第二年

第一期

金石學

定量分析（講義及實驗

藥品製法

罫書

製煉本科

一年半

製煉實試

実地化學

下秋元次郎

製煉豫科

第一年

第一期

算術

物理學

無機化學

第二期

代數

有機化學

化學試驗

檢質分析（講義及實驗

スルヲ許サス

第八條　生徒卒業ノ時更ニ終期ノ試業ノ受ケシム而テ該試業ニ於テ充分及第ノ者ハ其學力ニ應シ相當ノ卒業證書ヲ與フ可シ

豫科及本科

受持敎員

製作學　ワグチル

化學　外山正一

物理學及化學　熊澤善庵

數學　上野繼光

工作　長田銀造

金石學　和田維四郎

實地化學　庄司一簣

第二條　本塲ハ生徒各自ノ志ス所ニ因リ製煉、工作ノ諸術業ノ教授ス

第三條　入學ノ生徒ハ專ラ諸術業ヲ研學スル者ト雖𪜈化學、物理學、數學等ハ豫科課程トシ之ノ履修セサルノ得ズ

第四條　教科課程ハ三年トシ前一年半ヲ豫科トシ後一年半ノ本科及實地修業ノ期トス

第五條　本塲ノ生徒ハ通學生トシ授業料ノ要セス且生徒ノシテ本塲所用ノ器物ノ用ユルノ許スノミナラス又所要ノ藥品ヲ與フ可シ

第六條　本塲ニ入學ノ願フ者ハ齡十八歲以上ニシテ通常ノ作文讀書及算術ノ試業ヲ受ケ及第ノ者トス然レ𪜈時宜ニ依リ此他高等ノ試業ヲ受ケシムルコアル可シ

第七條　生徒ハ毎歲二度成規ノ試業ノ受ケシム而シテ該試業ニ於テ得ル所ノ評點數、百中ノ二十ヲ降ル時ハ次ノ學期ニ於テ本塲ニ在學

重學　（高等重學）　靜勢　運動

對畫

第三年

高等物理學　聽學　視學　實驗　積分

數理熱論

重學　動勢　靜水　動水　器械理論

對畫

第十二章

製作學教場

第一條　本場ノ學科ハ總テ邦語ヲ以テ教授シ其學ヲ別チテ製煉、工作、ノ二科トス

物理學　講義及實驗

法蘭西語

第二年專門科中級

熱動學理論及應用

結構強弱論

機器圖

機器功力及工場實驗　講義

鐵道測量及築造　講義　野外及館內實驗

地質學

物理學　講義及實驗

法蘭西語

土木工學　ワ[illegible]ン

物理學　[illegible]メ[illegible]

地質學及採鑛學　ノウマン

法蘭西語　古賀護太郎

地質學教授補　中野外志男

工學助手　多賀章人

第一年專門科下級

高等數學

重學及機械構成法

物質强弱論

圖畫推算學　講義及實驗

陸地測量　講義　野外及館内實驗

製造化學（ケミカル、テクノロジー）
物理學　講義及實驗
地質學
法蘭西學

第三年專門科上級

分析化學　（定量分析及試金）
製造化學
採鑛學　地質調査　測量　堀鑛　撰鑛

工學專門科課程

受持教員

機械工學（メカニカルエンジニアリング）　ヘミス

化學教授補　山岡次郎

地質學教授補　中野外志男

第一年專門科下級

分析化學（アナリチカル、ケーー）　（定質分析實驗及定量分析大意

冶金學（メタル、ナー）

有機化學（ノルカーノハケ　ーリー）

物理學　講義及實驗

金石學

法蘭西語

第二年專門科中級

分析化學　（定量分析

前二年間既修スル總科目ノ復習

列國交際法　列國交際公法　列國交際私法

法律討論演習

法論

拿破侖法律要旨

化學專門科課程

受持教員

分析及應用化學	アトキンソン
物理學	クダル
地質學及採鑛學	ナウマン
普通化學	ロックウヱル
法蘭西語	古賀護太郎

法蘭西語

國憲　該科ノ學ノト學ハサルトハ生徒ノ望ニ任ス

第二年專門科中級

証據法

訴訟法　民事訴訟法　刑事訴訟法

衛平法

海事訴訟法

法律討論演習

法蘭西語

羅馬法律　第一年ノ國憲ニ於ケルカ如シ

第三年專門科上級

法學專門科課程

受持教員

法學　グリグスビー

法學　アリン

法學　井上良一

法蘭西語　古賀護太郎

第一年專門科下級

不動産法

動産法

結約法

刑法

數學	三角法及應用
理學	心理學
物理學	重學初步　萬有物理
化學	普通化學　無機
博物志	金石學初步
畫學	用器畫學　幾何圖法及投影法

第二期

物理學	萬有物理　星學
數學	圓錐曲線法及代數幾何
理學	脩身學
化學	前期ニ同シ
博物志	地質學初步
畫學	遠景　機器圖　製圖演習

畫學　（自在畫法　（眞寫畫法　花果及人體）

第二期

英語學　論理及論文

數學　幾何終ル

史學　史學理論前期ノ續

經濟學

物理學　前期ニ同シ

博物誌　植物分類及植物生理　日本植物上ノ講義

畫學　（自在畫法　眞寫畫法　景色及築造物）

第三年

第一期

英語學　（論理及論文

英語學　英文學　作文

數學　代數　幾何

史學　法國史

博物誌　植物組織及解剖

畫學　自在畫法　圓體及實體寫法　實體寫陰法

第二年

第一期

英語學　英文學　作文

數學　代數終　幾何

史學　史學理論

物理學　初步實驗說明

博物誌　動物分類

地質學教授補　中野外志男

畫學　山岡成章

畫學　狩野友信

第一年

第一期

英語學　修辭作文

數學　代數幾何

地理學　地形

史學　英國史

博物誌　人身及比較解剖及生理

畫學　自在畫法　描畫及簡易ノ摸型寫法

第二期

普通科課程

受持教員	
物理學	ヷヰダル
博物學	マッカテール
英文學	サンマルス
數學	パーソン
數學	ウヰルソン
理學及史學	サイル
英語	アリン
金石學及地質學	ノノマン
普通化學	ロックウヱル
用器畫學	リフツン
物理學教授補	山川健二郎

驗ヲ經及第ノ者ニアラサレハ專門科ニ進入スルヲ許サス

第二條　普通科課程ハ三年トシ一年ヲ別チテ二期トス而シテ普通科第一年ノ生徒ヲ普通科第三級トシ同第二年ノ生徒ヲ同第二級トシ同第三年ノ生徒ヲ同第一級トス

第三條　入學試驗ニ及第ノ者ハ普通科第三級トシ普通科第一年ノ課程ヲ履修セシム但シ學力高等ノ者ハ更ニ試驗ヲ受ケ適當ノ級ニ入ルヲ許ス

第四條　後條ニ記載スル物理學專門科課程ハ從來在校ノ佛學生ノ爲ニ設置スル者ナルカ故ニ爾後新タニ入學ヲ許サス

第五條　次ノ課程中記載スル諸學科ノ外ニ國書ヲ讀ミ邦文ヲ作ラシメ洋書ヲ翻譯セシム且ツ法學生徒ハ日本法律及ヒ支那法律ノ要領ヲ學修セシム

第　鍍用品　品名品目品量品類ノ制度品

冶金學之部

第一　日本ノ冶金法ヲ[illegible]スルニ用ヰシ見本

動物學及植物學之部

第一　諸草木ノ乾葉ヲ集メ完備ノ者三十卷

第　本邦産出諸草木ノ乾葉ヲ集メ五卷

骸骨與及紙製ノ人體神經血液循環機消化機動物學ノ大別ノタル各種動物ノ模型并ニ足等ノ動物ノ乾腊保存スヘシ者及ヒ博物學ノ關文タル植物動物學ヲ講究スル用ユル諸圖書合アリ

第十一章

諸學科課程

第一條　普通科課程中　敎フル英語日本史物理學化學博物學畫學ノ試

九百箇

第三　生徒ノ用ニ供シ常ニ觸手ノ爲メ介石見本一千箇

第四　金石ノ色硬等ノ如キ物理學上ノ性質ノ解明スルニ用ユル

雜石數百箇

地質學之部

第一　歐米ヨリ購入スル岩石化石見本大約五千箇

第二　礦石燃料粘土建築用石等大約一千二百箇

第三　青銅製及石製ノ器具

第四　稀有化石ノ摸造

第五　本邦ノ地質ノ研究スルニ用ユル見本

採礦學之部

第一　直坑傾斜坑道掘材採掘機械通風機除水機運礦路運搬中等ノ

木製及中製ノ摸型大約五拾箇

測量學用諸器械即チセオトノイト數種
水平照準器採鑛用羅針盤定型[illegible]及三[illegible]、[illegible]目盤平面測量儀眞時
及平時辰器潜匣六圓儀舊用六圓儀及水銀地平器アイロト晴雨
指針及高低指針器水平視標竿間尺ノ鎖繩尺矢標等
圖學用品即チ諸圖木器械圖、家屋摸形螺旋形段階ノ摸型、隧道ノ
摸型幾何及配景圖ノ摸型等ナリ

第五條　現今所藏ノ金石地質採鑛冶金、植物、動物學ノ見本摸型等左ノ
如シ

金石學之部

第一　新調ノ金石見本即チ金石ノ凝結ノ示スニ見ルヘキ大ナル
見本及ヒ天然結晶、變体結晶等ノ見本ニシテ共ニ筒臺ノ玻
璃蓋下ニ排列スル者大約四千箇

第二　結晶學ノ講述スルニ用ヰル木製及玻璃製ノ結晶摸型大約

第四條　工學用ノ陳列品ハ大約左ノ如シ

木石煉化壓上力木材ノ横斷及捻斷力銅鐵ノ牽引力等試驗用ノ
諸器械

日本木材試驗ノ見本

英國木材及金屬試驗ノ見本

實用ノ經タル汽機各部ノ模型

汽門及機關各部ノ模型

齒車各種ノ模型

連鎖機接合ノ模型

水車ノ模型及喞筒ノ模型數種

リチャルド氏發見ノ示蒸氣計

棧橋及釣橋ノ模型數種

蒸氣船及帆走船ノ模型數種等

撿質分析用玻璃製諸器具
定量分析用諸器具
分量器數種
有機物分析用器
瓦斯分析用諸器即チウヰリアムソン及ラスセル氏瓦斯分析器、カセトメトル、晴雨儀バンセン氏瓦斯試驗器、蒸氣疎密測定器ス ノレングル氏水銀喞筒スペクトロスコープ、ガルヴァニ、クセルインダンシーンコイル等
試金用諸器
講義用諸器
製造化學用諸圖等ナリ
本校內製煉所ヲ設ケ各種ノ藥品ヲ精製新造シ以テ化學及物理學試驗ノ用ニ供ス

法蘭西及合衆國ノ度量日本度量衡两及和蘭ノ度量
液體及氣體試驗用ノ諸器械其中貴重ナル品ハレグノール氏瓦斯脹縮驗定器ダルトン氏蒸氣抵張力驗定器、ケイルサック及ヂュマス氏瓦斯疎密驗定器、排氣筒及水筒換器等
熱學試驗用ノ諸器械其中貴重ナル品ハメロ　氏射熱試驗器等
聽學試驗用ノ諸器ハレノールトオルガーイプス、サイレンス、クーニグ氏マノメートリックフレームアハレタス等
視學試驗用ノ諸器械其中貴重ナル品ハ臺鏡、透鏡、三稜玻璃等
電氣學用ノ諸器械其中貴重ナル品ハラムスノン氏プレート大電機器、カルハノニッハノー、トムソン氏ニノロルカルウノメートル及クワドラントエレキトロメートルモールス氏電信機ルームコルフ氏コイル等ナリ

第三條　化學試驗室須用ノ諸器械ニ在テ其貴重ナル品目大約左ノ如シ

國書　六千七百九十八冊

總計三萬四千七百七十八冊

第十章

諸器械等

第一條　本校所藏ノ器械摸型見本等ハ諸學試驗ノ爲メ各科ノ教授ニ貸附ス

第二條　物理學器械ハ稍完備シ該學科試驗用ニ供スルニ妨ケナシ本校製作學教場中工作場ノ設ケ百般ノ器械ノ修繕シ且ノ雛形ニ摸擬シ或ハ教授ノ工夫ニ據テ新器械ヲ製造ス

現今須用ノ物理學器械左ノ如シ

運動力試驗用ノ諸器械其中貴重ナル品ハケートル氏重力驗量

用搖錘及フーコールト氏地球回旋試驗用搖錘

第四條　書籍ノ紛失シ或ハ之ヲ毀損スルトキハ借受者其責任ノ相當ノ代價ヲ償ハシム

第五條　閲覽室ノ設ケ諸般ノ書籍雜誌新聞紙ノ備ヘ教授及生徒ノ求覽ニ供ス該室ハ休日ノ外毎日午後十一時二十分ヨリ開キ同九時ヨリ閉ツ書籍雜誌等一切室外ニ携出スルヲ禁ス

第六條　本室ニ集藏スル所ハ概ヌ參考書教科書ニシテ專ラ諸學校授業ノ用ニ供スル者ナリ本室ノ藏書兩三年已來其數大[illegible]加ス就中法學、化學、工學用ノ英書最モ多シトス現今所藏ノ書數左ノ如シ

英吉利書	一萬千七百　三册
法蘭西書	二千一百三十一册
獨乙書	二千百二十四册
和蘭書	六千七百　六册
漢書	四千二百十四册

服食物ノ習合セシメ以テ病患ノ豫防及ヒ速カノ保護ス

第三條 病舍或ハ居室ニ在リテ治療ヲ受ル者ハ伸ノ[illegible]四分一[illegible]メシム

第九章

圖書室

第一條 本室所藏ノ書籍ハ教授及生徒ノ用ニ供フル者トス

但參考書ハ貸付スルノ許サスト雖モ閲覽室ニ於テ借覽スルヲ得ヘシ

第二條 生徒所用ノ教科書ハ各自辨給スル者ト雖モ其自辨スル能ハサル者ニ限リ特ニ借受ノ許スコト有ヘシ

第三條 各級所用ノ書籍ハ教授及ヒ監事ノ捺印セル証書ニ據リ本室吏員ヨリ交付セシム

教員、職員、來訪者等ニ接スルハ禮讓ヲ以テシ同朋ト相交ルニ信義ヲ以テス可シ若シ此旨ニ戻リ或ハ平常品行正シカラサル者ハ本校ニ在學スルヲ許サス

第三條　各室生徒交番ヲ以テ當直一員ヲ設ケ室内不整頓ノ責ニ任ス可シ而テ室内諸品ノ汚染毀損等速ニ監事ニ申告ス可シ但シ齡十七年以下ノ者ハ當直ヲ除ス

第四條　定期試業ニ於テ級中第一ノ高第ヲ得ル者ヲ級長トス而シテ此名ヲ荷フ者ハ特ニ名譽ノコトヽス

第八章

病舍

第一條　病患者ハ病舍ニ入レ治療セシム

第二條　醫員ヲシテ少ナクモ毎月一次生徒ノ身体ヲ診査シ其居室衣

ニ於テハ願ニ依リテ其半額若クハ四半額ヲ減シ納ムルノ許スコトアルヘシ

第三條　寄宿生徒ハ食餌薪炭燈油等ノ費價ヲ納ムヘシ現今其費價壹箇月約金四圓トス然レ𪜈物價ノ高低ニヨリテ增減スルコトアルヘシ又舍用ノ器什ノ貸付シ衣服ノ洗滌ノ保管スルノ以テ每月末器什料トシテ金三拾錢洗滌料トシテ金二十五錢ヲ納メシムヘシ疾病ノ節給スル藥餌ノ料ハ其實價四分ノ一ヲ納メシムヘシ

第七章

生徒心得

第一條　生徒タル者必ス散步戯藝体操等ノ爲シ以テ身体ノ運動ヲ爲スヘシ体操ハ教員ヲ附シ其術ノ演習セシム

第二條　生徒タル者必ス身体ヲ淸潔ニシ衣服ノ整頓ナラシム可シ且

紀元節　二月十一日
神武天皇祭　四月三日

第四條　十一月一日ヨリ四月三十日マテ授業時間午前第八時ヨリ正午十二時ニ至リ午後第一時三十分ヨリ同第二時三十分ニ至ル五月一日ヨリ十月三十一日マテ授業時間午前第七時ヨリ正午十二時ニ至ル
飜譯及和漢學ハ午後第三時ヨリ同第五時ニ至ル一時間トス

第六章

生徒費用

第一條　毎月上旬授業料トシテ普通科ハ金二圓專門科ハ金四圓ヲ納附スヘシ

第二條　貧困ニシテ相當ノ授業料ヲ納ムル能ハサルノ事實明確ナル

學年及休業

第一條　學年ハ九月十一日ニ始リ翌年七月十日ニ終ル每學年ノ分テ二學期トス第一學期ハ九月十一日ヨリ翌年二月十五日ニ至リ第二學期ハ二月十六日ヨリ七月十日ニ至ル

第二條　夏期休業ハ七月十一日ニ始リ九月十日ニ終ル冬期休業ハ十二月二十五日ヨリ翌年一月七日ニ至ル而テ二月定期試業ノ後三日間ヲ休業トス

第三條　學年中每日曜日及水曜日半日ヲ休業トシ又左ノ國祭國祝日ヲ休業トス

神嘗祭	九月十七日
天長節	十一月三日
新嘗祭	十一月廿三日
孝明天皇祭	一月三十日

第四章

卒業證書及學位證書

第一條　普通科ノ卒業ノ者ハ學校長之ニ卒業證書ヲ與フベシ

第二條　專門科卒業ノ者アリ學校長其由ヲ文部卿ニ上申セハ文部卿試驗官ヲ派遣シ其學術ヲ撿査セシメ其學力ニ應シ學位稱號ヲ載スル證書ヲ與フベシ

第三條　卒業證書及學位證書ハ學年ノ終リニ於テ儀式ヲ備ヘ公然之ヲ附與スベシ

第四條　卒業生徒中最高等ノ者數名ヲ精選シ尚ホ其學術ヲ研究セシメン爲メ文部省之ニ學資ヲ貸付シ海外ニ留學セシムルヿアルベシ

第五章

ラサル者アルトキハ普通科卒業ノ證書ヲ受クルヲ得ス又專門科ニ入ルヲ得ス
專門科卒業ノ際諸學科中試業ノ式ニ中ラサル者アルトキハ學位證書ヲ受クルヲ得ス
但シ前二項ノ成規ト雖モ試業ノ式ニ中ラサル者二科ヨリ多カラス而シテ其科ハ諸科中最モ緊要ノモノニアラサレハ教授ノ申陳ニ依リテ勉勵有爲ノ生徒ニ限リ學校長之カ特別ノ處分ヲ行ヒ此成規ヲ止ムルコトアル可シ

第九條　生徒若シ一二ノ學科ノ點平均數六十點ニ充タサルトキハ再試業ニ於テ其欠點ノ補フニアラサレハ進級セシムルヲ許サス

第十條　生徒學力劣リ同級ノ生徒ト共ニ其課程ノ踐修スル能ハサル者ト認ムルトキハ調査ノ上學校長ノ意見ヲ以テ適當ノ級ニ降入セシムベシ

第四條　各生徒ノ一學科評點平均數ハ學期中日常講習ノ評點數ニ二ヲ乘シ定期試業ノ評點數ヲ加ヘ三ヲ以テ除シ以テ之ヲ定ムル者トス

第五條　各生徒ノ諸學科總評點平均數ハ各學科ノ評點平均數ニ一週間講習ノ時數ヲ乘シ而シテ其時數ノ和ヲ以テ其評點平均數ノ和ヲ除シ以テ之ヲ定ムル者トス

第六條　每學期ノ終リ各級生徒ノ姓名ノ諸學科評點平均數ノ順次ヲ表記シ各學科評點平均數ヲ併錄シ學校長ノ室内ニ揭示スヘシ又每學年ノ終リ印刷ノ一覽中ニ載スル生徒姓名ノ順次モ亦之ニ準ス

第七條　諸學科中一二ノ學科評點平均數四十點以上ニシテ六十點ニ充タサルモノハ二箇月間復習セシメ再試業ヲ受ケシム

第八條　普通科卒業ノ際生徒若シ從來踐修ノ諸學科中試業ノ式ニ中

第三章

試業及賞罰

第一條　毎學期ノ終リ生徒學業ノ進否ヲ檢シ其等級ヲ定メン爲メ定期試業ノ施行ス之ニ加フル、教授ノ意ヲ以テ臨時試業ヲ施行スルコトアルヘシ臨時試業ノ評點數ハ學期中ノ評點數ニ算入スヘキモノトス

第二條　定期試業ノ方法ハ筆記及口演ヲ以テス各學科ノ評點數ハ其教授ヨリ學校長ニ開申スヘシ

第三條　學期中各生徒ノ日常講習ノ評點及臨時試業ノ評點ハ帳簿ニ記シ置ク可シ此評點ハ十ヲ以テ最上點トシ零ヲ以テ最下點トス毎學期ノ終リ其帳簿ニ記載セル各學科ノ日常講習及臨時試業ノ評點全數ノ合算シ其定期試業ノ評點數ト通計シ約シテ百ノ最上點トシ學校長ニ開申ス可シ

算術及代數一次方程式

第二條　入學ノ期ハ毎學年ノ始メ一回トシ其試驗ハ學年ノ始終二回トシ各三日間ニ施行ス

第三條　上等ノ級ニ入學志願ノ者ハ先ツ第一條ニ記載スル科目ノ試驗ヲ經而テ其入ラント欲スル級ニ於テ踐修スル諸科ノ試驗ヲ受ケシム

第四條　入學志願ノ者ハ齡十六年以上トス

第五條　身體撿査ノ上體格勤學ニ適セサル者及ヒ種痘天然痘ノ爲サヽル者ハ入學ヲ許サス

第六條　入學試驗ノ經及第ノ者ハ此後必ス本校ノ諸規則ヲ循守シ且卒業前半途ニシテ退學スヘカラサル旨ノ記シ保證人連署ノ誓書ヲ出サシム

專ラ佛語ノ用井サルヲ得ス

第五條　本校内別ニ製作學教場ヲ設置シ國語ヲ以テ製煉工作ノ技術ヲ教授ス

第二章　入學

第一條　普通科ニ入學志願ノ者ハ次ニ記載スル科目ノ試驗ヲ經及第セサレハ入學ヲ許サズ

試驗科目

國書文章

英語作文

地理圖誌及地政

萬國歷史大綱

諸規則

第一章

編制

第一條　東京開成學校ハ文部省ノ所轄ニシテ諸科專門ヲ敎授スル爲ニ設クル大學校ナリ

第二條　現今諸學科ヲ敎ユル專ラ英語ノ用ヰサルノ得ス

第三條　現今設置スル諸學科修業ノ期各三年トス其科目左ノ如シ

第一　普通科

第二　法學科

第三　化學科

第四　工學科

此諸科ノ外漸次他ノ諸學科ヲ增設セントス

第四條　從來在校ノ佛學生徒ノ爲ニ物理學科ヲ設ク此科ノ敎ユルニ

趣ヲ實踐ス乃チ佛語ヲ以テ教授セル諸藝學獨逸語ヲ以テ教授セル鑛山學ノ名稱ヲ廢止シテ更ニ佛學生ノ爲ニ物理學ノ專門科ヲ假設セリ

二千五百三十六年本校優等ノ生徒十名ヲ選擢シ八名ヲ英國ニ二名ヲ佛國ニ留學セシム

ノ教育事務ヲ總理セシム是ニ於テ大學ノ二字ヲ去リ南校ト單稱シ且ツ教則等モ大ニ變更スル所アリ二千五百三十二年三月廿九日　皇上本校ニ臨幸シ學業ヲ叡覽セラル同年七月文部省全國ノ學制ヲ定メ八月三日此校ヲ以テ第一番中學トス二千五百三十三年四月遂ニ今ノ校名ニ改メ專門大學トス乃チ專門諸學ノ教則ヲ定メ法學理學工學ハ英語ヲ以テシ諸藝學ハ佛語ヲ以テシ鑛山學ハ獨逸語ヲ以テシ先ツ其豫科ヲ教授ス此年專門學科ノ爲ニ新校ヲ建築ス十月九日　皇上臨幸シ親ラ開業ノ儀ヲ擧行セラル爾後舊校ヲ以テ外國語學校トス十二月南山義成ヲ以テ學校長トス次年十月濱尾新ヲ學校長心得トス二千五百三十五年六月本校生徒十一名ヲ選ンテ九名ヲ米國ニ一名ヲ佛國ニ一名ヲ獨國ニ派遣シ以テ其所習ノ學業ヲ研究セシム七月濱尾新ヲ學校長補トス是ヨリ先キ二千五百三十三年四月文部省令シテ本校ニ於テ教授スル專門學科ハ單ニ英語ヲ以テ修業セシム此年ニ至リ漸ク其旨

與ル者五名アリ此年和蘭人ガラタマ氏ヲ以テ化學敎師トス是レ外國敎師ノ濫觴ナリ

二千五百二十八年即チ王政維新ノ際一時本校ヲ廢シ兵隊屯營トナス此年九月朝廷之ヲ再興シテ川勝近江柳川春三ヲ以テ頭取トス未タ幾クナラスシテ內田恒次郎之ニ代ル翌年一月細川潤次郎ヲ以テ學校權判事トシ校務ヲ掌ラシム此月佛人フーセー氏ヲ以テ佛語學敎師トシ英人パーレー氏ヲ英語學敎師トス四月米人ヴヱルベツキ氏ヲ以テ英語及學術敎師トシ尋テ敎頭ヲ兼子シム六月瑞西人ガデルリー氏ヲ以テ獨語學敎師トス七月細川氏轉任シ加藤弘之之ニ代ル其後校長數々更替セリ此年十二月校名ヲ改メテ大學南校トス二千五百三十年七月朝廷諸藩ニ令シテ其封土ノ多寡ニ應シ學生ヲ選擢シ大學南校ニ就テ習學セシム之ヲ貢進生ト云フ

二千五百三十一年七月朝廷令シテ大學ヲ廢シ文部省ヲ置キ以テ闔國

東京開成學校沿革略誌

東京開成學校ハ原ト九段坂ニ在テ洋學所ト稱シ舊幕府德川氏ノ創建スル所ナリ當時筒井肥前守川路左衛門尉大久保右近將監等之ヲ掌ルト云フ紀元二千五百十五年（安政二年）古賀謹一郎ヲ以テ頭取トス翌年二月蕃書調所ト改稱シ杉田成卿箕作阮甫等ノ教官トス此時獨リ德川氏ノ家臣ノミヲ教授セシム尋テ諸藩士モ亦入學ヲ許ス最初ノ教科ハ唯和蘭ノ語學ノミ其後英佛獨魯ノ語學及ヒ化學ノ一科ヲ漸次ニ設置シ教官堀辰之助西周助箕作貞一郎等ニ命シテ英和對譯辭書ヲ編纂セシメ之ヲ版行シテ永ク國家ニ稗益ス抑本校開業後數々校地ヲ轉移シ二千五百二十二年ニ至リ護持院原ニ黌舍ノ新築シテ之ニ移リ洋書調所ト改稱ス即チ現今ノ東京外國語學校是ナリ翌年又開成所ト改稱ス尋テ數學一科ヲ開設ス此年生徒四名ヲ魯西亞ニ留學セシム二千五百二十六年幕府命シテ生徒十四名ヲ英國ニ留學セシム時ニ本校ノ生徒其撰ニ

圖書掛	池田保光	静岡
製煉掛	井岡大造	岡山
醫員	杉島文圭	三潴

職員

監事	井上良一	東京
監事	古賀護太郎	長崎
器械取締	山岡次郎	敦賀
書記	五十嵐恭次	東京
用度	岸鐵次	岡山
營繕掛	羽田野國興	岐阜

實地工藝	長田銀造	東京
金石學	和田維四郎	敦賀
工學	多賀章人	千葉
化學	庄司一貫	東京
化學	下秋元次郎	石川
漢學	大島文	靜岡
漢學	丹羽忠道	愛知

化學	教授補	山岡次郎	敦賀
物理學	教授補 バチェロル、オフ、フヰロソフヒー	山川健次郎	青森
數學	教授補	上野繼光	東京
畫學	教授補	山岡成章	東京
地質學及採鑛學	教授補	中野外志男	敦賀
畫學	教授補	狩野友信	東京

土木工學　ジエムス、アール、ワ°ソン　米國

金石、地質、及採鑛學　ドクトル、オフ、フヰロソフヒー　エドマンド、ナウマン　獨國

物理學及重學　五等教授　アグレシェー、デ、シヤンス、フヰジック　ゴスターブ、ヘリクス、ベルソン　法國

英文學及化學　外山正一　靜岡

英國法律　五等教授　バチュロル、オフ、ロウ　井上良一　東京

物理學及化學　教授補　熊澤善庵　堺

法蘭西語　教授補　古賀護太郎　長崎

史學及理學	ドクトル、オフ、ギヴ井ニチー　マストル、オフ、アルト	ヱドウァルド、ダブリュ、サイル	英國
英語及法律	マストル、オフ、アルト	ホレショー、ヱヌ、アリン	米國
佛文學及史學	バッシリエ、エス、レットル、エ、ドクチール、アン、メデシン	レオン、ジュリー	法國
數學	リサンシエー、エス、シャンス、マテマチック、エ、リサンシエー、エス、シャンス、フ井ジック	ステフォン、マンジョウ	法國
物理化學及物理學	マストル、オフ、アルト	ヂー、ヂヱウヱト、ロックウェル	米國
製作學	ドクトル、オフ、フ井ロソフヒー	ゴットフラ井ド、フォン、ワグ子ル	獨國

博物誌及經濟學　デー、ベスーン、マッカテー　米國

バッシリヱ、ヱス、シヤンス

數學及羅甸　プロスペール、フォルチューン、フーク　法國

英文學及論理　ジヱムス、サンマルス　英國

マストル、オフ、アルト

英國法律及列國交際法　ウヰリアム、イー、グリグスビー　英國

バチヱロル、オフ、サ井ヱンス

分析化學及應用化學　ロヘルト、ウヰリアム、アトキンソン　英國

機械工學　ロヘルト、ヘンリー、スミス　蘇國

マストル、オフ、アルト

數學　ウヰリアム、ヱドウヰン、パーソン　米國

學校長及教員職員

學校長

マストル、オノ、アルト

學校長　畠山義成　鹿兒島

學校長補　濱尾新　豐岡

教員

萬有物理學及實驗　トクトル、オフ、ヂヴヰニチー　マストル、オフ、アルト
ピーノヱル、ヴヰ、ヴヰダル　米國

英語及數學　マストル、オフ、アルト
ホレース、ウヰルソン　米國
トクトル、オフ、メヂシン、マストル、オフ、アルト

第一學期ノ始メ	九月十一日ヨリ
神嘗祭 休業	九月十七日
午前第八時ヨリ授業	十一月一日ヨリ
天長節 休業	十一月三日
新嘗祭 休業	十一月廿三日
冬季休業ノ始メ	十二月廿五日
明治十年開業	一月八日

學暦　明治九年

開業	一月八日
孝明天皇祭　休業	一月卅日
定期試業ノ始メ	二月二日ヨリ
紀元節　休業	二月十一日
第一學期ノ終リ	二月十五日
第二學期ノ始メ	二月十六日
神武天皇祭　休業	四月三日
午前第七時ヨリ授業	五月一日ヨリ
定期試業ノ始メ	六月廿九日ヨリ
第二學期ノ終リ	七月十日
夏季休業ノ始メ	七月十一日ヨリ

生徒姓名

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